IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	*	CIVIL ACTION
PLAINTIFF,	*	CA-C-10-075
VS.	*	
BRYAN SHAW, ET AL.,	*	CORPUS CHRISTI, TEXAS DECEMBER 5, 2011 9:03 A.M.
DEFENDANT.	*	

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TRANSCRIPT OF FINAL PRETRIAL/BENCH TRIAL - DAY 1

BEFORE THE HONORABLE JANIS GRAHAM JACK
SENIOR UNITED STATES DISTRICT JUDGE

APPEARANCES:

FOR THE PLAINTIFF: MR. JAMES B. BLACKBURN, JR.
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ALSO PRESENT:	MR. TODD CHENOWETH MR. BILL WEST MS. SUZANNE SCOTT MR. JOHN SMITH

(The proceedings began at 9:03 a.m.)

(Call to Order of the Court.)

THE CLERK: Court calls Civil Action C-10-075, The Aransas Project versus Bryan Shaw, et al. May I have appearances, please?

MR. BLACKBURN: For the Plaintiffs, Your Honor, I'm Jim Blackburn. And sitting with me at Plaintiff's table, Jeff Mundy, Mary Conner, Charles Irvine, David Kahne, Patrick Waites.

THE COURT: Thank you.

MR. WILLIS: Your Honor, Matthew Willis for the State Official Defendants. Sitting with me is John Hulme, Marshall Coover, and our representative is Todd Chenoweth.

THE COURT: Thank you.

MR. FERNANDES: Good morning, Your Honor. Edward Fernandes on behalf of Defendant Intervenor Guadalupe-Blanco River Authority. With me here today is Kathy Robb, Kathy Snapka, Bruce Wasinger, and Chris Taylor. And our corporate representative is Mr. Bill West.

THE COURT: Thank you. Yes, sir?

MR. McCARTHY: Good morning, Your Honor. Edmond McCarthy for the San Antonio River Authority. And with me also here today is our corporate representative, Ms. Suzanne Scott.

MR. RAMIREZ: And, Your Honor, my name is Ken Ramirez. I'm here on behalf of the Texas Chemical Council.

THE COURT: Thank you.

MR. RAMIREZ: And with me is General Counsel and Vice President of the Chemical Council, Christina Wisdom.

THE COURT: We have extra tables we could put up. I think we called around Friday and y'all said you didn't need any more. Maybe you do.

UNIDENTIFIED SPEAKER: I think we're okay.

THE COURT: Okay. Could you get, maybe at noontime, Ms. Cayce, to have the people come up and see if they can hook up the tables?

THE CLERK: Yes, Your Honor.

THE COURT: Sorry that was so late. I should have just said I've denied them all, on the record, but I thought you deserved more than that. And here it is trial time. Do you need any more copies?

Do you all want to offer exhibits for pre-admission that are unobjected to?

MR. WAITES: Yes, Your Honor.

MR. WILLIS: Your Honor, may I -- for the record, before, you know, you tend to that, I wanted to point out to the Court that last night Plaintiffs, I'm sorry, the State Defendants withdrew objection to Exhibit, Plaintiff's Exhibit 142, I believe. So no objection to that exhibit as well, Your Honor.

THE COURT: All right.

MR. WAITES: Does Your Honor have a preference as to how we do this? Should we offer all exhibits on our list that are not objected to? Would that be acceptable?

THE COURT: That would be the thing to do.

MR. WAITES: Plaintiff makes that offer.

THE COURT: What -- give me the numbers, for the record, please.

MR. WAITES: Okay. Plaintiff offers Plaintiff's Exhibit 1, 2, 3, 4, 5, 6, 7, 8, 9 --

THE COURT: Could it be like 1 through 100, or something like that maybe?

MR. WAITES: Yes. Yes.

THE COURT: Okay.

MR. WAITES: 1 through 12, 21, 22, 24, 25, 27 through 113, 140 to 144, 147, 151, 154, 157, 158, 160 --

THE COURT: Wait a minute. I'm sorry. 158?

MR. WAITES: Yes.

THE COURT: Okay.

MR. WAITES: 161 to 196. And I apologize, Your Honor. Some of the numbers I have given in fact do have objections to them, and I -- that was an oversight. Would you prefer that I offer at this time only the unobjected to --

THE COURT: I thought we decided that.

MR. WAITES: I apologize, Your Honor. Of the ones that --

THE COURT: Is that it for your offer, and then you're going to subtract?

MR. WAITES: No, that's not all. I'll complete the offer then --

THE COURT: Okay.

MR. WAITES: -- if that's all right. Ms. Court Reporter, where did I leave off?

THE COURT: 196.

MR. WAITES: Okay. 203, 208, 217 to 227.

THE COURT: Sorry, to 227?

MR. WAITES: Yes, Your Honor.

THE COURT: Okay.

MR. WAITES: 237 to 264, 269, 353 to 370. Well, I'm sorry, they objected -- that will end at 364. The rest were objected to.

THE COURT: Okay. Now, go back and take out the ones that have been objected to under 364.

MR. WAITES: Okay. So at this time Plaintiffs do not offer Plaintiff's Exhibits Number 22, 25, 27 to 32, 36, 37 --

THE COURT: Wait a minute. So 38 to 113?

MR. BLACKBURN: No, Your Honor, beginning at 73, 73 to 76 there are objections to.

THE COURT: Okay. So 38 to 72.

MR. WAITES: That is correct.

THE COURT: And?

MR. WAITES: Then withdrawing 73 to 76.

THE COURT: Okay. So that's 74?

MR. WAITES: For the offer.

THE COURT: Are you withdrawing 75 and 76?

MR. WAITES: Those do have objections, so at this time, we are.

THE COURT: Okay. Go ahead.

MR. WAITES: Yes. Okay. Okay. So then the next that is withdrawn for now is Plaintiff's 111.

THE COURT: Okay. Hold up. So 77 to 110, and 111 to 140?

MR. WAITES: 111 had an objection, so that is withdrawn for now. We're offering 112 and 113. In the series following, there are a number that are reflected as withdrawn on the exhibit list, and we were not offering those.

THE COURT: What is withdrawn, please?

MR. WAITES: In that section, from Plaintiff's 114 to Plaintiff's 139.

THE COURT: Okay. So only 140 is remaining. 140 to 144. Is that right?

MR. WAITES: We offer 141 --

THE COURT: Do you offer 140?

MR. WAITES: Oh yes, Your Honor, I'm sorry. 140 to 144.

THE COURT: Okay. Do you have a place to stay,

Mr. Coover?

MR. COOVER: Yes, ma'am.

THE COURT: Oh, good.

MR. WAITES: We are offering 147, 151, 154, 157, 158, 161.

THE COURT: I have 161 through 196. Is that correct?

MR. WAITES: 162 to 169 have objections, so we do not offer them at this time.

THE COURT: Okay. Wait a minute. 162 through 169. Right?

MR. WAITES: That is correct, Your Honor. Those are --

THE COURT: So 170 through 196?

MR. WAITES: Yes. Those are all offered at this time.

THE COURT: All right.

MR. WAITES: And I believe the rest of the list we had correct.

THE COURT: Any objection? Do you want me to go over those again? Any objection to these offered?

MR. FERNANDES: The only objections we have to any of the exhibits are going to be -- and I think I heard this right, is going to be Exhibit 270, 307 --

THE COURT: Those are not offered. Just please tell me if you object to any of the offered exhibits.

MR. FERNANDES: I thought that was on the list.

THE COURT: No.

MR. FERNANDES: Okay. Chris, do we have any objections?

MR. TAYLOR: No, Your Honor.

THE COURT: State?

MR. WILLIS: No, Your Honor.

THE COURT: All right. Plaintiff's Exhibits 1 through 12, 21, 24, 33, 34, 35, 38 through 72, 74, 77 through 110, 112 through 160 -- sorry. 112 and 113, 140 to 144, 147, 151, 154, 157, 158, 163, 170 to 196, 203, 209, 217 to 227, 237 to 264, 269, 353 to 364 are admitted, without objection.

State?

MR. WILLIS: Yes, Your Honor.

THE COURT: Any exhibits?

(Counsel conferring off the record.)

MR. WILLIS: Your Honor, we'll let GBRA's attorney tender them. We've got them all in one group, so both the State --

THE COURT: So I just should call them Defendants?

MR. WILLIS: Fair enough, Your Honor.

MR. TAYLOR: Okay. Your Honor, Defendants offer, and I'll -- we offer Defendants' Exhibits 1 through 375, except for the following: Defendants' Exhibit 5, Defendants' Exhibit 13, Defendants' Exhibit 22 and 23, Defendants' Exhibits 27 through

35, Defendants' Exhibit --

THE COURT: Okay. Let's do this another way. Just tell me the ones that you're offering, please.

MR. TAYLOR: Your Honor, Defendants offer Defendants' Exhibit 2, 4 --

THE COURT: What about 1?

MR. TAYLOR: I'm sorry? We've got, Your Honor, a conditional offer, subject to an agreement. The parties had agreed, subject to Your Honor's approval, that they would, we would offer the objections that included the mortality numbers, that capitalize on, subject to our ability to object and move to strike those exhibits later on during the trial.

THE COURT: So do I just admit them?

MR. TAYLOR: Provided we have not --

THE COURT: I admitted them without condition.

MR. TAYLOR: No, this -- I'm talking about Defendants' exhibits.

THE COURT: So you want -- okay. You want to offer the mortality figures without -- conditionally?

MR. FERNANDES: Your Honor, as you know, we still haven't had a ruling on the motion to exclude, based upon reliability. And so we have a number of documents, if this Court denies that motion, then we would want to enter, offer some of those exhibits. And so what we were --

THE COURT: Just offer the unobjected to,

unconditional exhibits now, please.

MR. FERNANDES: Okay.

THE COURT: So we can get started sometime today.

MR. TAYLOR: Okay. Defendants offer Defendants' Exhibit 2, Exhibit 8 through 12, Defendants' Exhibit 16, Defendants' Exhibit 19, 21, 24 through 26, 36, 39, 41, 43 and 44, 47, 56, 60 through 64, 71, 73 through 74, 83 through 85, 90, 100, 104, 106, 110, 112, 113, 117 through 120, 145 through 147, 194 through 222, 224 and 225, 229 through 231, 238 through -- I'm sorry, 240 and 241.

THE COURT: I'm sorry, 238 through, or just 238?

MR. TAYLOR: No, sorry, just 238, and then 240 and 241, and then 244 through 307, 311 through 375.

THE COURT: Is that it?

MR. TAYLOR: Yes, Your Honor.

THE COURT: Any objections from the Plaintiff?

MR. WAITES: No objections, Your Honor.

THE COURT: All right. Defendants' Exhibits 2, 8 through 12, 2 and 8 through 12, 16, 19, 21, 24 through 26, 36, 39, 40 (sic), 43, 44, 47, 56, 60 through 64, 70 (sic), 73, 74, 83 through 85, 90, 100, 104, 106, 110, 112, 113, 117 through 120, 145 through 147, 194 through 222, 224, 225, 229 through 231, 238, 240, 241, 244 through 307, 311 through 375 are admitted. These are Joint Defendants' Exhibits.

Would you hand these to the clerk, please. Only the

ones that have been admitted, please.

MR. WAITES: Your Honor, the complete set that we have, we would -- do we need to take them over, but remove the ones that are not yet admitted?

THE COURT: All right, please do that. This is something you should have done before you came in here. I certainly can't pre-admit exhibits that have been objected to.

Now, I assume Dr. Chavez-Ramirez is going to be here personally?

MR. BLACKBURN: Yes, Your Honor.

THE COURT: Okay. As well as Larry R. Soward?

MR. BLACKBURN: He is going to be here, Your Honor. He is not here today.

THE COURT: Okay. I just want to make sure he's here, because those are the Daubert challenges.

MR. BLACKBURN: Yes, Your Honor. And they've been -- Dr. Ramirez, Dr. Chavez-Ramirez is actually here right now. Mr. Soward will be in later this week.

THE COURT: That's fine. Thank you. And how much time do you all think this is going to take to try?

MR. BLACKBURN: I believe, Your Honor, we had originally been given 40 and 48 hours in a much earlier hearing we had. I have set our case up to try to work within those time limits, and I would say that we're certainly thinking in those terms.

THE COURT: I have -- the conflict that I have is that I have jury duty on the 12th of December. So I have to go over to state court and see what happens there, and then come back, or not come back.

All right. But I would like you all to move it a little quicker than two weeks. So we'll keep the time, by the way, and your cross-examination comes out of your case time as well.

Anybody want to, while they're fiddling with the exhibits, anybody want to make opening statements?

MR. BLACKBURN: Your Honor, I would be happy to just go ahead and start with opening statements, if that would be fine. I would give this assignment to someone else, if that would be okay.

THE COURT: That would be great.

MR. BLACKBURN: If you will give me a moment, and I will be ready.

(Counsel conferring off the record.)

MR. BLACKBURN: Could I ask you to turn on the computer for the Plaintiff's table, please?

May I proceed, Your Honor?

THE COURT: Please.

MR. BLACKBURN: Good morning. I and my associates are here before you representing The Aransas Project and bringing to you a case that we believe really matters. At

stake in this litigation is nothing less than the future of the endangered whooping crane, which is an international symbol of what it means to recover from the brink of extinction, a magnificent bird whose recovery was a guiding force in the passage of the Endangered Species Act by Congress decades ago, a bird that resonates with me to the very center of my soul.

I come before you alleging that the Commissioners, the Executive Director and the Water Master of the Texas Water -- of Texas Commission on Environmental Quality, the TCEQ, violated the federal Endangered Species Act and continues to implement policies that in the future, perhaps as early as this winter, will again violate the federal Endangered Species Act by causing a take of whooping cranes by their administration of water use permits.

THE COURT: Hold on just a second. What is that?

MR. ROSAS: I'm sorry, just setting up an easel.

THE COURT: We don't have easels here, so you can take it right back down. That's what all this equipment is for. Go ahead.

MR. BLACKBURN: Thank you, Your Honor. I was talking about the TCEQ and how they violated the federal Endangered Species Act --

THE COURT: Is that an admitted exhibit?

MR. BLACKBURN: Um --

MR. WAITES: Yes, Your Honor.

THE COURT: Okay.

MR. BLACKBURN: I was hoping it was, Your Honor -- that the TCEQ violated the federal Endangered Species Act and continues to implement policies that perhaps as early as this winter will again violate the Endangered Species Act by causing a take of the whooping crane.

This case is about an archaic system of Texas water use permits that were issued when water was considered to be wasted if it made it to the bay. This case is about Texas policies that give no priority, that allocate no water to the San Antonio and Aransas Bay systems, upon which the whooping cranes depend. Left alone, the State of Texas and its policies and permits will starve San Antonio Bay of water, just as Nueces Bay was starved and destroyed as a functioning estuary decades ago.

Your Honor, let me be clear. We believe the evidence that you will hear is clear and convincing that there is a relationship, that there is proximate causation between lowered fresh water inflows to the bay and whooping crane deaths. That's the result from the policies of TCEQ.

This is not a case about droughts. This is a case about the effects of drought being worsened by policies of the State of Texas. Texas has a duty under the Endangered Species Act, if not under some other authority, to curtail its actions when they fundamentally altered the natural system to the

extent that an endangered species is either harmed or harassed or both.

This case is about science. It's about statistics. It's about biological field work. It's about simulation modeling that presents a causal chain of fresh water inflows to -- from fresh water inflows to whooping crane mortality.

You will hear substantial evidence at this trial about how Texas water use patterns can significantly and absolutely change coastal ecosystems.

This case is not about this Court establishing United States policy on endangered species. Congress took that step in 1973 when it enacted the Endangered Species Act. Congress specifically set out in Section 9 that it was illegal for any person to take an endangered species.

"Take" was included as being, meaning to harm and harass. Those terms had been defined by the United States Fish and Wildlife Service and federal regulations.

"Harm" is an act that actually kills or injures wildlife. Such an act may include significant habitat modification or degradation, where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or shelter.

And "harass" means the intentional or negligent act or omission which creates the likelihood of injury by annoying -- to wildlife by annoying it to such an extent as to

significantly disrupt normal behavioral pattern. We have both actions in this case.

Now, our case, it will begin with the presentation to you of Dr. George Archibald, a man who has devoted his life's work to cranes in general, and to whooping cranes in particular. Dr. Archibald has a unique role with the International Crane Foundation, traveling around the world as an advocate for cranes, while serving on the Whooping Crane Recovery Team here in the United States, which was formed under the United States Endangered Species Act.

Dr. Archibald will present an overview of the struggle for whooping crane recovery and will cover many important aspects of crane behavior. Dr. Archibald is a whooping crane expert to such an extent that an opposing expert referred to him as "the guru of whooping cranes." We will present the guru to you.

Dr. Archibald will be followed by Dr. Ronald Sass, the biogeochemist and ecologist who spent his life working as a professor of biology, chemistry and ecology at Rice University.

Dr. Sass will show you his ecological and statistical analysis that demonstrates an amazing correlation between fresh water inflows into San Antonio Bay between July and December and whooping crane mortality.

Dr. Sass will present his statistical analysis --

THE COURT: You mean the lack of or too much of fresh

water?

MR. BLACKBURN: In terms of too little.

THE COURT: Too little, okay.

MR. BLACKBURN: The lack of fresh water inflows. Dr. Sass will present his statistical analysis that shows the significant correlation between these lowered inflows and crane mortality, and he'll present a biogeochemical explanation for this causal relationship.

Dr. Sass will be followed by another Ricœ professor, Kathy Ensor. Dr. Ensor was asked to review Dr. Sass's statistical methods, because she's head of the statistics departments at Rice. And she's going to be testifying about his methods and other statistical methods that she employed to establish by multiple statistical methods the statistical correlation between these lowered inflows and crane mortality. And again, it's a striking piece of statistical evidence.

THE COURT: Are you familiar with Coastal Bend Bays and Estuaries?

MR. BLACKBURN: I am, Your Honor.

THE COURT: Do you, don't you think they've made a difference in working with the State to increase the fresh water inflows?

MR. BLACKBURN: Yes and no. I mean, certainly they've developed good information. In terms of actually getting any water allocated, that has not happened and is

unlikely to happen to any extent that will be helpful here.

THE COURT: Okay.

MR. BLACKBURN: The problem is, literally, there is no mechanism currently, particularly in the San Antonio Bay system, to get the water in. In the Nueces Bay system, the recovery that's being discussed is about taking a dead bay and trying to somehow restore it. The starting point for Nueces is different than every other estuary on the coast.

THE COURT: Because it's dead.

MR. BLACKBURN: Because it's dead. We can kill a bay. We've done it. The question is, can we prevent it from happening in San Antonio Bay. And that's what we're here for. But the current policies that we'll talk to you about and we'll show you will lead to the destruction of the habitat. It's critical. It's important. That's why we're here, Your Honor.

Now, to the extent that Your Honor is interested, Dr. Ensor is prepared to talk about the role of statistics in scientific causation and kind of the role there. I know that this is a, kind of a tricky scientific kind of area where science and law overlap in an interesting way.

And when we say it's a science case, it's really a question about how statistics fit into causal relationships and how these two things kind of intermesh. And Dr. Ensor will be prepared and able, to the extent allowed by Your Honor, to discuss that.

Dr. Felipe Chavez-Ramirez will be following Dr. Ensor. He is another bona fide expert on whooping cranes, who's on the Whooping Crane Recovery Team.

Dr. Chavez gets wet and muddy. He gets out in the field. He works with the cranes, both here at Aransas and up at Buffalo Wood.

THE COURT: Who does the banding?

MR. BLACKBURN: Dr. Chavez does.

THE COURT: Okay.

MR. BLACKBURN: He can talk to you about banding. In fact, he's been out in the field this last week banding. One of the disputes that will be brought before you is he took some videos while he was out there last week, and there's a dispute over whether that would be allowed into evidence or not.

But he's out in the field. He bands birds. He bands chicks up in Buffalo Wood. He bands adults and juveniles here at Aransas, if he can convince them to come close enough to his trap, which sometimes he's more or less successful with it.

Dr. Chavez has recorded extensive data about the feeding and drinking habits of whooping cranes, and he'll testify that salinity matters to the cranes. He will present extensive testimony about the cranes in Aransas and how they perform during periods of high salinity, about the importance of blue crabs, about the disruption of these feeding patterns associated with high salinity conditions, and about how

essentially the birds have difficulties in their search for food during these times of low inflows, and particularly in times of harsh conditions.

Dr. Chavez will be followed by Dr. Paul Montagna. Dr. Montagna is the expert on Nueces Bay and San Antonio Bay estuarine systems. He's from here at the Harte Institute, and is with the Texas A&M University in Corpus Christi.

Dr. Montagna knows the Texas Coast. He has studied the Texas Coast.

THE COURT: Was it the Harte Institute that decided that BP wasn't causing any ecological problems in, for their spill?

MR. BLACKBURN: I do not know that, Your Honor.

THE COURT: I believe so.

MR. BLACKBURN: He has a contrary opinion --

THE COURT: Okay.

MR. BLACKBURN: -- with regard to the coastal --

THE COURT: Okay.

MR. BLACKBURN: -- area of Texas --

THE COURT: I understand.

MR. BLACKBURN: -- and fresh water. And you might have a chance to ask him about that, Your Honor.

THE COURT: I think I would.

MR. BLACKBURN: I have no doubt you might.

Dr. Montagna's an expert on the Science Advisory

Committee of the Bay and Estuarine Program of the State of Texas, and he will testify about the importance of estuaries in general and about what happened to Nueces Bay and about how, under certain types of policies, the bays will be killed.

Dr. Montagna's also studied blue crabs. He's studied them throughout the coastal area. He'll testify about the life cycle of blue crabs, about the way in which blue crabs interact with the estuarine system and about the role that salinity will have in the distribution of blue crabs.

He will show that they are, in fact, related directly to -- blue crab abundance is directly related on the shoreline of San Antonio Bay, where the whooping cranes are, to salinity, which is directly related to fresh water inflows.

Our fresh water inflow evidence will be presented by Joe Trungale, who will do two things. He will look at the policies of the State of Texas, and he will show what those policies do in terms of altering flows.

We have historical flows. We will project future use, full use of existing permits and what that will mean. We will go back and add back flows into the river system to show what inflows would be without the permit system having its effect.

These are difficult analytical exercises. I'm sure they'll be subject to vigorous cross-examination. But they give you the picture of what the State permit pattern does.

THE COURT: I understand that. I don't know if it's even with objection that you say that. But what -- the people of Texas have constitutional rights to water. How do you get around that when you ask for your prospective relief?

MR. BLACKBURN: Drought management can be done in a number of ways.

THE COURT: That's what I'd like for you to focus on, please, when you're with your experts.

MR. BLACKBURN: I will be happy to, Your Honor. But you know, they're -- particularly Larry Soward, who is coming --

THE COURT: Okay.

MR. BLACKBURN: -- after Mr. Trungale. And again, it's sort of, Your Honor, I mean, some of these points of evidence we can go through very quickly. If, in fact, you would prefer -- if these are not issues that you think we should spend time on, give us some guidance, and we will do the adjustments that we need to do to try to expedite getting to what Your Honor's interested in hearing.

Larry Soward is coming. He is a former Commissioner of the Texas Commission on Environmental Quality. He will be able to testify about both the -- and his -- and there are objections to his testifying. But he is a -- he passed, he was a lawyer for many years. He no longer has his law license active.

There is objection to him talking about the law of Texas, which I think is not a good objection, because Larry Soward is the Texas, was the Texas Commissioner on Environmental Quality for many years and can talk about the policies of the State of Texas and what they mean. That, I think, is in many respects a crux of the case.

We've also got Andy Sansom and Dave Frederick coming. Andy Sansom used to be head of Texas Parks and Wildlife, and he is now head of the Texas River Institute in San Marcos. He has been very active in a, what's called the Edwards Aquifer Recovery Implementation Plan, which is an extremely successful exercise at figuring out how to get water out of the Edwards Aquifer for the endangered species at the springs.

That has been a marvelous success story. And I think that, you know, this is what we're offering as our concept of actions that we wish Your Honor to take. Mr. Sansom will come in and will describe, in probably as long as Your Honor would like for him to talk, about how they were able to put together this Recovery Implementation Plan that has taken an impossible situation in the Hill Country and has turned it into a win-win solution for bays, I mean, for the flows in the river systems and for a process to provide water for the cities that need ground water up in the Hill Country.

Dave Frederick is here, a former Fish and Wildlife Service official, to describe the role of a Habitat

Conservation Plan.

THE COURT: The focus that I see, and you all -- I'll hear from everybody about this -- is that I denied your motion for, partial motion for summary judgment on standing, because it kind of has to play out. I understood you've established injury in fact and redressability, at least for purposes of getting past the Defendants' motion for summary judgment.

But what I need to know is a causal connection between the low flow conditions created by the Defendants, if any, and crane mortalities, which, as I understand, you're going to address with your experts.

And then where, if you did prove a taking -- I mean, you need to prove a taking. I mean, that's sort of the crux of the whole case. Right?

MR. BLACKBURN: And that's what our experts --

THE COURT: And then whether you've demonstrated that the Defendants are the proximate cause of the take. I mean, those three issues, I think, are the crux -- is there something else I need to be focusing on? Everybody's shaking their heads in agreement.

MR. BLACKBURN: I believe that's correct, Your Honor. We need to prove that the actions of TCEQ caused or set in motion a series of events -- because it is a chain of causality that we will be presenting to you, and that's why, you know, in my --

THE COURT: And then --

MR. BLACKBURN: I'm sorry.

THE COURT: And then I want to be careful, too, about letting somebody talk to me about the law.

MR. BLACKBURN: I understand. And we will be very careful.

THE COURT: I'm talking about witnesses explaining the law to me, which is probably a little over the top. But on the other hand, I have to tell you that I had a Fifth Circuit Judge, who was a party in here one time, who took the stand and told me what the Fifth Circuit would do with the whole case. So you know, I'm kind of lenient on that and sifting through it.

MR. BLACKBURN: Well, I mean, we will try not to abuse your leniency, and appreciate the, you know --

THE COURT: It's your courtroom.

MR. BLACKBURN: I understand. I appreciate that, Your Honor. But what I would tell you is that we believe that we have a suite of both experts and witnesses that in fact will present, from the water being taken out of the river, to the impacts to the crane, to what we think is a reasonable solution.

And I'd like to emphasize that. We are not asking for all the river water to come to the cranes. We believe that there has to be a fair process set up. We, right now, our

position is the cranes are getting no water. There's no guarantee. We think they belong in that process. They belong on the table for water.

THE COURT: You think they should just apply to TCEQ for a water permit?

MR. BLACKBURN: Well, that has been done. And that was denied.

THE COURT: Okay.

MR. BLACKBURN: So that was --

THE COURT: Are you serious?

MR. BLACKBURN: I am dead serious, Your Honor. That was done -- SMRF, the San Marcos River Foundation, applied for a 1.15 million acre feed after, you know, that would be water after everything else that was already, permit was taken out. And both the TCEQ denied it and the legislature basically ratified that denial. So it was pretty much taken off the table.

THE COURT: I remember that. Earlier in the case we did talk about that.

MR. BLACKBURN: Right. And so, I mean, this is why we take the position that the existing process does not offer us a remedy. And we think this Court has the, both the authority and the ability to craft a, frankly an excellent remedy that will work for many generations to come on the Texas Coast.

Your Honor, that's the case we intend to present. I am honored to be in your courtroom and will do my best to present a professional first rate case.

THE COURT: I have no doubt that you all will, and I'm looking forward to this. It's an interesting, it's a very interesting case to me, and I think I told you all earlier that my husband and I are birders, so we also like the whooping cranes and appreciate what they do for the area.

And I think you know that also that I was responsible for granting a large amount of money from a criminal case to the Coastal Bend Bays and Estuaries, which was their seed money, that they have rolled into several million dollars now. And so I do have an interest in these things, but I also understand that there may be constitutional limitations in Texas as to what, prospective relief.

MR. BLACKBURN: I understand, Your Honor.

THE COURT: And so I'd like some help on you all, all of you explaining that to me.

MR. BLACKBURN: Well, we'll do our best as we can, Your Honor. I think we are -- I would just like to stress that we are sobered by the fact that this is a daunting challenge to make, to come up with something that works. We will make every attempt that we can to be both reasonable and honest and straightforward in our work with the Court.

THE COURT: I've found you all to be so. Thank you

very much.

MR. BLACKBURN: Thank you.

THE COURT: Yes, sir.

MR. WILLIS: Your Honor, may I?

THE COURT: Please.

MR. WILLIS: Ms. Cayce, is the --

THE COURT: A toggle, please, on the --

MR. WILLIS: Your Honor, may it please the Court. Based on the order from the Court we got this morning, it will shorten my remarks to the Court considerably. With due respect to Mr. Blackburn's argument, we do believe that what the, the fact that the Court has already pointed out the issues that will need to be addressed, we agree with that, with whether or not there was in fact -- or let me rephrase that -- whether or not the evidence that the Plaintiff brings forward in this case will establish a take under the ESA, and also whether or not, the issue of causation on behalf of the State official Defendants. We think that the issue of causation is extremely important.

THE COURT: I do too.

MR. WILLIS: I appreciate that.

THE COURT: Without that, there's no case.

MR. WILLIS: I agree. And Your Honor, having said that, I intend to defer to Mr. Fernandes, who's going to address primarily the issue of causation here in just a moment

for the Court.

But I'd like to address another issue that I believe is very important. And I have no intention of going through in depth on this, Your Honor. But I would like to point out to the Court several issues that I believe the Court will find throughout the evidence in this case are extremely important from the standpoint of the State official Defendants. And it goes to both, primarily to redressability, Your Honor, and what the constitutional issues that you've already alluded to.

THE COURT: On the other hand, I guess under the supremacy clause, you know, I would hate to think that I would be so far reaching in an opinion to disregard the constitution of the State of Texas and a century and a half, really, of water rights and water law.

MR. WILLIS: Your Honor, I will jump forward in my -- well then, let's go through a century and a half of water law. And I think that you've already pointed to something that's extremely important. And Mr. Blackburn referred to essentially the permitting system with the State as an archaic system. I can't argue that it's archaic, Your Honor, because it's property law, and it's something that we cannot get past in understanding that in this instance, and especially in this lawsuit.

The 1967 Water Rights Adjudication Act was actually one of the, although we skip through the 13 and 17 acts where

there were attempts to create, the legislature attempted to create avenues to try to allow water rights holders that had been recognized for years to be able to establish those through a court proceeding. And portions of the act in 1917 were found later unconstitutional, so it wasn't until 1967 that the Water Rights Adjudication Act was passed that actually was a combination, it was the first time where it actually merged the legal system of recognizing prior adjudication system as well as the common law riparian rights holders.

And, Your Honor, the thing that's important to understand is that the adjudication process in 1967 was simply a method to recognize and record property rights that had long before been perfected, and in many cases on the San Antonio and Guadalupe River that the Court will see, years before is easy for me to say, some of them hundreds of years before 1967.

And so it is a property right. And as the Court knows, the Texas Commission on Environmental Quality regulates many aspects of the State resources, including water quality. The TCEQ has always, has always treated the water rights different from other aspects of permits that the TCEQ grants or denies, such as water quality. And the reason they have is the same way the Texas legislature always have, is because it was a vested property right. And the issue is whether or not TCEQ has any authority to essentially violate any aspect of the recognized property rights of the water rights holders.

The Court is going to hear evidence of, on the Guadalupe and San Antonio River, by the mid, well, the 1967 act, the Adjudication Act, the vast majority of the water that is allocated -- well, there's no need to get in depth on the issue of the allocated to use right now, because the Court's going to hear evidence to that, but the vast majority of the water that's allocated through the, on these two rivers, was allocated as a result of the Adjudication Act of 1967.

That doesn't mean that in 1967 through '70 something, whenever this adjudication process occurred, that that's essentially the date that -- I'm sorry. Go ahead.

THE COURT: No, I understand all of this. My concern is this, what if the Plaintiffs prove that there is a taking and that there's a causal relationship between the taking and mortality and it is a taking under the endangered -- they prove everything they have to prove, is there any remedy that Texas could commit themselves to, to help reverse that trend, if I find that to be the case? Is there any possibility?

MR. WILLIS: Your Honor, I don't pretend to be able to answer the direct question of what the State of Texas could do right now that you could order, but I think that you will see that the State of Texas is deeply involved in the Senate Bill 3 process that you're familiar with as to addressing every aspect of the problems that the State has the authority to address under the constitution.

THE COURT: Does the State think they have authority to address this particular -- I think SB 3 doesn't necessarily mention the whooping cranes or endangered species.

MR. WILLIS: Your Honor, with due respect, I can't answer that. But if you'll give me till after lunch, I'll try to get you an answer to that, or I'll put a witness on the stand during this trial that can.

THE COURT: I may have that axe backwards. Is that the one that says no, it doesn't mention endangered species? Plaintiffs? SB 3?

MR. BLACKBURN: SB 3 does not specifically mention endangered species. SB 3 is about coastal bays and estuary inflows and a process.

THE COURT: I got it. So what is it the State thinks they can do under SB 3 that can help the whooping cranes, if indeed the lower salinity is -- the increased salinity is endangering these species, or constitutes a taking?

MR. WILLIS: Well, Your Honor, first --

THE COURT: Or the lack of fresh water inflow. Is there anything the State can do?

MR. WILLIS: Without usurping the science witnesses that will be speaking directly on the subject, I will address this to the Court, that the process itself is, even in 1985, the legislature gave the TCEQ authority to put particular environmental conditions in new permits. The Senate Bill 3

process is much broader than that, and it allows both the science teams to make recommendations from a clearly scientific basis as to what's needed, as well as the stakeholders a chance to give their input into it.

THE COURT: But if --

MR. WILLIS: It's the State -- I'm sorry, Your Honor. Go ahead.

THE COURT: Go ahead.

MR. WILLIS: No, I was going to say, Your Honor, I believe the TCEQ's position is that this process, if allowed to work itself through, on any aspect of new permitting, we believe that this will make a much more environmentally sensitive system that takes into account the bays and estuaries and the needs from an environmental standpoint.

THE COURT: But if you turn down the permit of the whooping crane, I mean to get the fresh water, then I don't see how there's anything that Texas has done that can make a difference.

MR. WILLIS: Well, Your Honor, I was afraid you'd ask that question while I was sitting there, and again, that's one of those, I can't speak to that specifically, but I certainly will for the Court after lunch.

THE COURT: This whole thing could be resolved if you would grant the permit, I think.

MR. WILLIS: Well, Your Honor, I'd like Mr. Blackburn

to address that, because I believe --

THE COURT: Is that possible?

MR. WILLIS: I believe that it will be Mr. Blackburn's position that even if you granted that permit, that it, based on the priority system and first in time and first in right, I think he would still argue that it won't be sufficient. And that's essentially what the TCEQ has pointed out to the Court, that at some point what Mr. Blackburn requests is not something that can be fulfilled in this instance.

MR. BLACKBURN: I would agree, Your Honor, that we do not think simply the award of the permit at the tail end of the process will address the problem. I would say --

THE COURT: That's not going to be enough water then.

MR. BLACKBURN: It wouldn't be enough water left over by the time you got to their right. What needs to happen is a drought management plan that we think there is authority for that would cause rollbacks and curtailments and sort of guarantees of some amount of water getting in.

THE COURT: I know. But you understand that that really just turns, that turns upside down the riparian rights of the State of Texas for centuries.

MR. BLACKBURN: You know, Your Honor, I honestly don't think it does. The concept that the riparian rights are always based on a reasonableness of use, and that

reasonableness of use has always been subject to various types of correlative rights and sharing of rights. And I don't think that is inconsistent at all. I think it has to be done carefully. It has to be done in very specific conditions. But I think it can be done.

THE COURT: I understand that. I mean, there are cities that have filed, wanted to intervene and I didn't allow them to, but that have concern about the water, fresh water to their cities, the city population. I think San Antonio. Right?

MR. WILLIS: Yeah, San Antonio River Authority is obviously in the suit, but --

THE COURT: Yes. And then there are farmers that didn't -- I don't know if I let the farmers. That was a close call for me, to not let the farmers in, because I thought that other people here could represent their interests. But I'm always mindful of that. So in a drought, do you take from the farmers to give to the whooping cranes, from the bread basket to get -- I mean, I don't know, it just seems to be an incredible --

MR. BLACKBURN: It is a difficult situation --

THE COURT: -- solomaic task to come up with a remedy if I find that all you say is true.

MR. BLACKBURN: And I agree. I think it will challenge the Court in many respects. But I would just urge,

we're not asking you to make the allocation decision. We're asking you to put in motion a process that will lead to that decision. And that is, I think, the basis upon which we argue that the other parties would have ample opportunity, if there was a remedy crafted like what we're asking, which would be to set a process in motion.

THE COURT: I understand.

MR. WILLIS: Your Honor, in deference to what Mr. Blackburn is saying, essentially what TAP is requesting here is a permit, but they are asking to, they're asking for essentially a super permit. They are asking to get a super priority date, to where the bays and estuaries would have the first in time of the priority for the water, because if they were, if the bays and estuaries were allowed and were a permitted individual or a permitted entity to be able to take water under the permitting system, the original first in time first in right rule still applies, and yet what you just indicated was -- actually, Mr. Blackburn said he's not asking the Court to allocate the water. That's essentially what TCEQ, as the queen appropriators, has to do on a daily basis. It has to make daily decisions on this.

And within the framework of the statutory authority of the agency, I think you're going to hear some evidence, it's fairly amazing as to how they handle that task and what they do, again, within the framework of what they are allowed to do

by the legislature.

So, Your Honor, with that said, if you've got no more questions, I'll let Mr. Fernandes address the other issues.

THE COURT: Thank you.

MR. WILLIS: Thank you.

MR. FERNANDES: Thank you, Your Honor. Your Honor, I understand you're not low tech like me, but can I approach and give you a copy of this chain of causation?

THE COURT: No, because I've got it.

MR. FERNANDES: Okay.

THE COURT: And I've got it right here on my screen.

MR. FERNANDES: Okay. Thank you. First, let me --

THE COURT: It's a miracle.

MR. FERNANDES: -- apologize for any inconvenience we might have caused with any noise during Plaintiff's Counsel's opening statement.

THE COURT: That's all right. I mean, that's why we don't have easels any more, by the way, because we've got all this. And everybody in the courtroom can see it.

MR. FERNANDES: Beginning with the U.S. Supreme Court case, as this Court is well aware, Babbitt v. Sweet Home, the cases have consistently held that the ESA take provision is subject to the ordinary requirements of proximate cause. What we're going to try to remain extremely focused on in this case is causation and science. We believe that after a few actually

early examinations of Plaintiff's witnesses, we're going to be so efficient that we're going to be able to give hours back to this Court, because we think that basically when we get through with those examinations, it's going to be abundantly clear that, I don't like to overstate positions, but this is one of the most attenuated take cases of causation theories in the history of the ESA.

And why? Because we're going to go through each of those causal links and we're going to go through with their witnesses and ours, and there's not going to be a lot of disagreement even some with theirs about why, when you look at these seven links, they just don't get there.

And you really start, it's kind of interesting in this case, because logically, you would start from the last, the argument that the State regulation of water diversions reduced inflow to the estuary, you'd move forward. But they kind of jump to link, they try to jump to link number seven and say 23 whooping cranes died during the winter of '08-'09 because of water diversions and all of these various things.

THE COURT: Well, you all disagree as to whether 23 died.

MR. FERNANDES: Yes. We --

THE COURT: Is that right?

MR. FERNANDES: Yes. We are -- basically it's -- well, one thing that is clear, two carcasses, a portion of a

third carcass and a pile of feathers were found. We agree on those four. The 19 cranes that they say died because they were missing and presumed dead on aerial surveys we say did not die. That's why 17 cranes showed up the following year that were unexpected. They all happened to be adults, because they probably were the juveniles that were missing from the winter before.

And then we also say, if you go up to DX --

THE COURT: There's another place the whooping cranes go to winter, isn't it?

MR. FERNANDES: Yes.

THE COURT: An artificially created -- it's in New Mexico, or where is that?

MR. FERNANDES: They, they migrate 2500 miles to Wood Buffalo in Canada during, and spend the summer.

THE COURT: Right. But when they come south, there are two places they come south.

MR. FERNANDES: They actually --

THE COURT: One place only?

MR. FERNANDES: Through the fly zone, they come through a number of places on the way down.

THE COURT: I don't know, I guess I thought that someone was trying to create another place.

MR. BLACKBURN: There are -- you will hear about attempts to create artificial flocks. They have been

unsuccessful.

THE COURT: Okay. I just wanted to rule out the fact that those 17 could have gone to New Mexico, or you know, to Antigua for the holidays or something.

MR. BLACKBURN: We'll talk about that, but we don't think so, Your Honor.

THE COURT: Okay. Thank you.

MR. FERNANDES: We think they stayed right here, and just were not detected.

THE COURT: Okay.

MR. FERNANDES: Let's go to Exhibit 75. Exhibit 75, DX Exhibit 75, this is the crane that's been used on all of the newspaper articles, it's been used on the web site, it's been used to recruit members. I dare say it's probably gone to every reporter in the country. And we're going to show that this crane did not die because of water diversions. We're going to show that this crane was necropsied. And this crane --

THE COURT: What does that mean?

MR. FERNANDES: It's the equivalent of --

THE COURT: It's a dead crane.

MR. FERNANDES: It's an autopsy.

THE COURT: Okay.

MR. FERNANDES: Okay.

THE COURT: You mean it was killed by autopsy?

MR. FERNANDES: No, no. The autopsy revealed that this crane had a traumatic injury to its leg.

THE COURT: Okay.

MR. FERNANDES: The whooping crane coordinator even suspected that this crane was the crane that had, was injured, was having difficulty walking in Canada before it migrated, was having difficulty eating in Canada before it migrated, and then died shortly after it got to Aransas. That's what happened with this crane.

Now, with respect to --

THE COURT: You're just not very sympathetic to these cranes.

MR. FERNANDES: Oh, we're trying to focus on science.

THE COURT: Okay. Okay.

MR. FERNANDES: Trust me, there's not anybody on this side of the fence that doesn't recognize the importance of these cranes to this state.

THE COURT: I was just kidding. I know you do.

MR. FERNANDES: We -- but in any event, this is kind of what got us here, 23 cranes died, and they show this crane and that crane. The necropsy revealed traumatic injury to its knee. Long before it got down here, it was having trouble eating. Long before it got down here, that knee injury became infected. That's why it died and couldn't eat. It had nothing to do with water diversions.

Now, let's walk through -- remember what they're doing here. TAP is going to tell you that they can establish the cause of death of 19 cranes, with no carcasses, with no body. And this is how they're going to do it. This is the causal link to causation in this case.

First, they start out and they say the State regulation of water diversions reduced inflow to the estuary. And then you have to look at the alternatives, and you're going to listen to all their experts and ours on some of these alternatives, not the drought, not lawful diversions under pre-existing periods.

Then the second causal link to causation is going to be that reduced inflows, the reduced inflows caused an increase in salinity. Now, there we're going to go through issues with all the experts, not the drought, not tides, not temperatures, not evaporation, not other climatic conditions. And you're going to find that their own expert is going to tell you all of those things are equally or more important in connection with the effect on salinity than water inflows.

Then we get to the third causal link, that those incremental increased salinities cause a decrease in blue crab or wolfberry abundance. Why do I use the word "incremental"? You're going to hear that all of these water diversions together, the impact on salinity is one part per thousand. Remember, this case is, they're --

THE COURT: Say that again, please.

MR. FERNANDES: All of the diversions, its impact on salinity in the bay is one part per thousand. So they're going to have to argue, show that those incremental increased salinities caused a decrease in blue crab and wolfberry abundance. And they're also going to have to show that the decrease in blue crab or wolfberry abundance was not caused by tides. And you're going to hear from their experts tides causes blue crab abundance. Not Fish and Wildlife Service's failure to enforce its no crabbing guidelines. You're going to find that they admittedly were looking the other way, that's their own words, and not enforcing their own crab guidelines in the refuge. Not commercial crab trapping that was going on, not temperatures, not oxygen levels, and not other climatic conditions.

And when we walk through with each expert on both sides and we focus on that, you will see their own expert is going to tell you that salinities, in terms of its effective, effect on crab abundance, is way down the list there.

THE COURT: Did red tide affect anything that year?

MR. FERNANDES: That's not -- nobody's made that contention in this case.

THE COURT: Okay. Any connection -- what are the natural predators of whooping cranes there? Snakes and alligators there?

MR. FERNANDES: There's a whole host of things, and all we know is that from those two carcasses, one of those cranes died because it was attacked by a predator. That's all we know.

The next thing is that the decreased blue crab and wolfberry abundance caused injury or death to the cranes. Now, to show this, first of all, they're going to have to show that blue crab and wolfberry were not abundant. And then they will admit, even though they didn't, in connection with our findings of fact, they will admit that these cranes eat about 52 different food items.

So they're going to have to show that no other foods provide sufficient energy; that no traumatic injury sustained during migration caused the death, even when the necropsy shows that's what happened; that no predation caused the death, even though the necropsy for crane number two shows that happened; that no known probable causes identified in prior years happened here. You're going to hear that the Recovery Plan for 57 years has identified probable causes of death, and they've never identified water diversions or increased salinity. That no diseases or infection or no other natural causes caused the death.

Then you get to link number five, those incremental, increased salinities caused the cranes to fly to ponds to drink fresh water. The ponds are .3 miles from the salt water. They

could walk there. These cranes migrate 2500 miles to Canada. On that one, they're going to have to show that the reason why they went to the fresh water ponds had nothing to do with the fact that Fish and Wildlife Service placed supplemental feeders next to those ponds on that year and that year only for the first time in 40 years, and that even Fish and Wildlife said 20 percent of the flock used those feeders right next to those ponds.

They're also going to have to show that it was not because of the Fish and Wildlife Service's prescribed burns, which induced the cranes to go to the uplands. In '08-'09, because they thought there were food shortages, they conducted more prescribed burns than ever before, which induces the cranes to go to the uplands to eat in the uplands.

They're going to have to show that it was not the food in the fresh water ponds. There's not just water in those ponds, there's a lot of food in there.

They're also going to have to show that it's not the cranes' normal foraging behavior. You're going to hear that when salinities in the bay are high, they're observed at the fresh water ponds drinking. When salinities in the bay are low, they're observed at the fresh water ponds drinking.

And then finally, the last one there is that the increased trips to the ponds resulted in energy expenditures that caused injury or death of the cranes. And there we get

back to the same causal link, that it was not an injury before they got to Aransas, which is reflected in the necropsy in the bird that's walking around on Mr. Stehn's arm, it's not predation, it's not known probable causes. And you'll hear from, I guess Mr. Archibald, who's the longest serving for TAP's side, a member of the Recovery Team, about probable causes of death for the last 57 years. This is totally outside of that.

And basically, you'll also hear from the Recovery Team that they have never determined cause of death without a carcass, and they never heard of anybody doing so until TAP filed this lawsuit. And so our focus is going to be on causation.

THE COURT: You know, for your objections, by the way, about all this, the testimony coming and going --

MR. FERNANDES: Yes.

THE COURT: -- usually I prefer -- the reason I didn't hold a separate hearing --

MR. FERNANDES: Yeah.

THE COURT: -- is it's just easier to hear it and say -- it goes to the credibility. And I can just disregard -- if your cross-examination is vigorous and brilliant, like I expect, then I can judge from that. Okay?

MR. FERNANDES: We understood that. And that's why actually we had reached agreement with the other side. I know

you didn't want to do it conditionally, but we had reached an agreement that let's let it all go in, and then let's --

THE COURT: I'll let it go in, but I don't want to do the conditional thing.

MR. FERNANDES: Yeah, yeah.

THE COURT: I can look at it and say this is not particularly credible.

MR. FERNANDES: And then after it's through, we urge our objection at the appropriate time. We understand this is a bench trial, not a jury trial. Okay.

And so that's where we're going to keep the focus on the case. We're going to try to keep the focus on the case on science and causation and look at all of those chains and see just how many breaks there are in the line. And frankly, we think after the Plaintiffs gets through their case, there's going to be so many breaks in this causal link to causation that we're going to be able to put on a very, very, very short case.

THE COURT: Thank you. So it's a bad time to say "red herrings" in this case. Right?

MR. FERNANDES: You know, when I moved to Texas in 1985, I used to say "red herrings" and nobody knew what I was talking about, because I didn't realize that was more of a New England thing. So thank you.

THE COURT: All right. Are you ready for witnesses?

MR. BLACKBURN: Yes, Your Honor. Would you like -- have we got our trial exhibits?

THE COURT: Have you got the exhibits organized?

MR. BLACKBURN: Would you like us to bring those forward, Your Honor?

THE COURT: Please.

MR. BLACKBURN: Where would you like them?

THE COURT: Ms. Cayce.

MR. WILLIS: Your Honor, if I may, Your Honor, two of the Defendants' exhibits are State of Texas database for water permits. To say they were voluminous is an understatement. And when they are printed out, it's almost impossible to make heads or tails of them. So what we've done is we have them on just the disk format, electronic format, to tender to the Court as exhibits. I just wanted to --

THE COURT: Perfect.

MR. WILLIS: Okay. Thank you.

THE COURT: We're all grateful for that. Did he give you the -- did the Defense give you the exhibits? Is that everything?

THE CLERK: Yes, Your Honor.

(Court and Clerk conferring off the record.)

THE COURT: Hold it. Are you giving me a disk and boxes or --

MR. WILLIS: Not of -- of these two particular

exhibits, this is just the disks, Your Honor.

THE COURT: Okay. What numbers are the disks, exhibits?

MR. WILLIS: The two databases are 302 and 303, and then --

THE COURT: Microphone, please. I'm sorry.

MR. WILLIS: I'm sorry, Your Honor.

THE COURT: The two databases are 303 --

MR. WILLIS: 302 and 303 on one disk.

THE COURT: All right, thank you.

MR. WILLIS: And then a separate database is on 304.

THE COURT: Where do you want the boxes, Ms. Cayce?

(Court and Clerk conferring off the record.)

THE COURT: Now, somebody asked for daily transcripts. I want to explain to you the problem with that. For the same reason you have to be in front of a microphone, this court is, doesn't have a traditional court reporter. It has an electronic recording operator. Everything is recorded digitally. There are cameras from the -- I mean, there are microphones built into the walls, back there for the jury, hanging up there for the tables, microphones on your desks, microphones in various places. You don't want to be away from a microphone for too long. Everything is digitally recorded.

At the end of the day, for twenty -- $26?

COURT RECORDER: It's gone up to 30.

THE COURT: It's gone up to 30 -- $30, you can purchase a disk of the proceedings from Ms. Gano, and you can transcribe it, you can listen to it, you can do anything you want to.

Another thing that's recommended is that you, for I think it's $250 to get your own software, called FTR Gold software, and we should have told you about this in advance, and you can put it onto one of your computers, you can correspondingly have the same thing she's getting, but you can mark it, like to save for cross-examination or save for closing arguments or to save to bring up for your own witnesses. You understand what I mean? I think I waited too late to tell you about that, because nobody -- I didn't realize there was an issue about same day transcripts.

But I think you might find it beneficial at least for whoever was asking for same day transcripts, to get the -- of course, you can have your own court reporter if you want. Did anybody want that? It won't be an official record, but you can get a court reporter. Okay. Again, you can purchase those disks, the CDs, at the end of every day. Go ahead.

MR. BLACKBURN: I --

THE COURT: Also, I'm sorry, I've got a cold and --

MR. BLACKBURN: Well --

THE COURT: I'm on low doses of steroids, so if I'm cranky, I blame it on that. It doesn't help my batting

average, apparently.

MR. BLACKBURN: I'm not going to comment on that, Your Honor. May I ask a question before I begin --

THE COURT: Yes, sir.

MR. BLACKBURN: -- with the witness? We have gone through the rulings that you made, and you denied our motion, our partial motion for summary judgment on standing.

THE COURT: Yes, sir.

MR. BLACKBURN: I think primarily it looks to us to carry the proximate cause issue through the trial. Is that correct, Your Honor?

THE COURT: That's correct.

MR. BLACKBURN: And so we, I guess my question is, in our direct case, can we assume that the injury in fact and redressability portions of standing have been satisfied, or do we need to bring the standing witnesses in and basically put that testimony on live before Your Honor?

THE COURT: It was really for purposes of summary judgment, I think, the redressability. It doesn't mean that you've got standing for everything. It doesn't mean everything's there. I would go ahead and suggest that you put on all the evidence you intended to put on.

MR. BLACKBURN: Okay. That's what I needed to know, Your Honor. And we had not planned to start off our case with that portion, but we will integrate it into the case as we go

along. And so we were hopeful of having a big victory on summary judgment, but --

THE COURT: I appreciate that.

MR. BLACKBURN: I would like to call Dr. George Archibald to the stand, please, Your Honor.

THE COURT: Thank you.

(Witness sworn.)

THE COURT: Take a seat, please.

MR. MUNDY: May I give him a bottle of water, Your Honor?

THE COURT: You may. And anybody I can see, anybody that wants water can bring it in, as long as you do it with a capped bottle, or however drinking thing you use, because down the middle of those counsel tables are all electronically wired.

(Court and Clerk conferring off the record.)

THE COURT: Good morning.

THE WITNESS: Good morning.

THE COURT: You may proceed.

GEORGE ARCHIBALD, PLAINTIFF'S WITNESS NO. 1, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Would you state your name, please?

A. George Archibald.

Q. And where do you live, Dr. Archibald?

A. Baraboo, Wisconsin.
Q. And where is Baraboo, Wisconsin?
THE COURT: Could you lean forward a bit?
THE WITNESS: Oh, sure.
THE COURT: Sometimes when people speak so quietly, I ask them to put their right elbow on the -- and then that puts you right --
THE WITNESS: Okay.
THE COURT: -- kind of, I mean, put your whole right arm on there, if that's not too uncomfortable.
THE WITNESS: No.
THE COURT: And that will put you right by the microphone.
THE WITNESS: Okay.
BY MR. BLACKBURN:
Q. Are you situated, Dr. Archibald?
A. Okay, fine.
THE COURT: Is that comfortable?
THE WITNESS: Yes, very.
THE COURT: Okay.
THE WITNESS: Thank you.
THE COURT: Would you like a pillow?
THE WITNESS: No. Unless it's made of feathers.
BY MR. BLACKBURN:
Q. In what capacity are you here today, Dr. Archibald?

A. I'm representing a member of the Whooping Crane Recovery Team and co-founder of the International Crane Foundation.
Q. And when did you co-found the International Crane Foundation?
A. 1973.
Q. And how long have you been working with cranes?
A. Since 1966.
Q. And would you please describe your educational background?
A. I have a undergraduate degree in biology and chemistry from Dalhousie University in Halifax, Nova Scotia, and a doctorate from Cornell University, and several honorary doctorates.
Q. And I would like --
THE COURT: Certainly Cornell is premier in ornithology.
THE WITNESS: Yes, ma'am.
BY MR. BLACKBURN:
Q. And where are your honorary doctorates from?
A. From Southern Methodist University, University of Wisconsin, Mount Allison University in New Brunswick, and Dalhousie University in Nova Scotia.
Q. And I'm going to ask that Exhibit 254 be placed on the screen, and there is a, there is a hard copy if you'd like to refer --
THE COURT: Could you zoom that up a little bit?

MR. BLACKBURN: I'm sorry?

THE COURT: Could you zoom it up a bit? Oh, is that on your own PC? Okay. Thank you.

BY MR. BLACKBURN:

Q. And I just wanted to, I mean, there is a hard copy if you'd like to refer to it, but is this a true and correct copy of your resumé --

A. It is.

Q. -- that you provided us? And when, could you identify for Judge Jack whether you have received any awards over the years?

A. I've received many awards, the most outstanding of which was 1984 I was one of the first MacArthur Fellows. That's awarded for creativity. Several years ago I was awarded the first Indianapolis Prize, which selects the world's foremost achiever in conservation.

Q. Are you a member of any of the committees that are established under the Endangered Species Act?

A. I am a member of the Whooping Crane Recovery Team and have been since 1990.

Q. What is the Whooping Crane Recovery Team?

A. The Whooping Crane Recovery Team is a group of ten people, five from Canada, five from United States that meet regularly to talk about problems facing the whooping cranes and solutions.

Q. You've been on the Whooping Crane Recovery Team for, what,

21 years?
A. Yes.
Q. You say there are five Canadian members and five United States members. Is that what -- did I remember that?
A. Yes.
Q. Who are the members from the United States?
A. Myself; Tom Stehn, until recently, who was the Refuge Biologist at Aransas. That seat is now empty but will soon be filled; Marty Folk from the State of Florida; Felipe Chavez from Texas, and John French, sorry, from the Patuxent Wildlife Research Center in Maryland.
Q. And what are your responsibilities, as a member of the Recovery Team?
A. To be aware of what's going on with whooping cranes throughout the continent, to read the literature, to meet with people involved with the whooping crane, to bring problems associated with the whooping crane to this forum, and to update the Whooping Crane Recovery Plan every so many years.
Q. And would you describe any participation by representatives of the State of Texas on the Recovery Team over the time that you've been a member?
A. LeeAnn Linam, who works for the Texas Parks and Wildlife Service, served on the Whooping Crane Recovery Team during the 1990s. And of course Tom Stehn has been on it for several decades, or a couple of decades, and he was the Refuge

Biologist at Aransas until the end of October, when he retired.
Q. But he was a federal employee, not a state employee?
A. Right. He was federal.
Q. Okay. Now, would you please describe for Judge Jack what the International Crane Foundation is?
A. The International Crane Foundation is a nonprofit organization dedicated to the conservation of the world's 15 species of cranes, 11 of which are threatened. And our activities are in many Asian, African countries and in North America. We have a staff of 40 people.
THE COURT: I'm sorry, did you say 50, 50 cranes?
THE WITNESS: Fifteen species.
THE COURT: Fifteen.
THE WITNESS: Right.
BY MR. BLACKBURN:
Q. And of those, how many are endangered?
A. Eleven. And the whooping crane is the rarest of the cranes.
Q. So from a worldwide basis, the whooping crane is the rarest of the 15 crane species?
A. Right. The whooping crane is the rarest and perhaps the best known of all the cranes. It's known worldwide because it was reduced to just 15 birds in 1941, and has slowly climbed up to almost 300. And it's become a symbol internationally of conservation success, recovering from the brink of extinction.

Q. And would you please describe the relationship of the International Crane Foundation to the Plaintiff organization The Aransas Project?

A. The Aransas Project was started after the loss of many cranes and impact on the local fisheries in the San Antonio Bay after the drought in the winter of 2008-2009. And I have been coming down to Texas for the past 15 years. We started this crane festival in Port Aransas to promote public education about the needs of the cranes and fresh water inflows and all the other factors in the environment that concern these magnificent birds. And I met different people that were concerned about the problems back in 2009 and eventually met Mr. Blackburn. And the International Crane Foundation received a presentation from Mr. Blackburn about The Aransas Project, and the board of directors of the International Crane Foundation unanimously voted to become a member of The Aransas Project and to become more involved in what we consider a grave crisis.

Q. And what activities do, does the International Crane Foundation participate in here in the Texas Coast?

A. We are very active participants every February in the Whooping Crane Festival. One of our employees does programs in schools around this watershed for several weeks, but that will be increased to several months. And we have a full-time employee, Dr. Elizabeth Smith, who's one of the foremost

wetland ecologists in Texas, is now working full time for the International Crane Foundation, and she has an office here in Corpus Christi.

Q. And with regard to tours and things like that, do you have a role or responsibility from that standpoint?

A. Yes. I do two guided tours during the Whooping Crane Festival on the *Wharf Cat*, a big boat that takes out about 55 people from Port Aransas through the refuge during the Whooping Crane Festival. And I have been doing that for 15 years.

In addition, I give several lectures at the Whooping Crane Festival and have lectured broadly in Texas.

Q. And would you explain how an organization such as the International Crane Foundation might be affected by the loss of a whooping crane or two? You know, I've had people tell me it doesn't make any difference.

A. We are concerned about the sustainability of the whooping crane population that has a very narrow margin of survival, considering that about 8 percent of the birds are lost during the migration from the time they leave Texas until they return. And we only have a 12 percent gain of the population through productivity every year. So there's a very narrow so-called profit margin that could easily be turned in the opposite direction, especially if mortality increased on the wintering grounds.

THE COURT: Say that again. 8 percent loss each year

in migration, and 12 percent increase.

THE WITNESS: Right. Then there's loss on the wintering grounds, which would be added to the 8 on the average.

BY MR. BLACKBURN:

Q. So let me, let me get that right. You're saying there's 8 percent is just sort of what you accept as what happens on migration and during --

A. The summer.

Q. -- the summer. There's --

THE COURT: And every now and then somebody just shoots one as they're going by. Right?

THE WITNESS: That would be in the 8, yes. Uh-huh, Your Honor, uh-huh.

BY MR. BLACKBURN:

Q. And then there's a group of chicks that are fledged, and that's your plus 12 percent. Is that right?

A. Right.

Q. And so when you're talking about the concern about the wintering grounds, would you explain to the Judge exactly what that concern is?

A. If you look at the evidence of fresh water inflow salinity in the marshes at the Aransas Refuge over the past 21 years, and Dr. Sass will be speaking about this in great detail, you can see that there are some years, I believe that there are

eight years in which the salinity was very high and the fresh water inflow was low. It was periods of drought. And the mortality of our whooping cranes increased significantly during those years of drought, 3 percent, 4 percent. In years of good fresh water inflow, the mortality rates were very, very low, one or two birds perhaps. The worst year --

Q. Wait, wait, wait. The Judge --

THE COURT: Go ahead. The worst year was?

THE WITNESS: 2008-2009. We believe that we had a very high mortality rate that year.

THE COURT: Okay. Let me ask you this. The 8 percent does not consider the mortality at the wintering grounds?

THE WITNESS: No.

THE COURT: Or at the summering grounds.

THE WITNESS: Right.

THE COURT: How much is that?

THE WITNESS: And during migration.

THE COURT: During migration is 8 percent. But in Canada and here, that doesn't include the --

THE WITNESS: The 8 percent includes everything from the time the whooping cranes leave Aransas until they return.

THE COURT: Okay.

THE WITNESS: They're scattered all over the place. And we don't have good counts, except at Aransas in the winter.

Although we have very accurate counts of the number of breeding pairs, but that's only a portion of the population.

BY MR. BLACKBURN:

Q. There is a, an --

THE COURT: So what happens in a wintering ground is not included in the 8 percent.

THE WITNESS: No. So if we have a 12 percent gain and we're losing 8 percent during migration, if we had a 4 percent loss during the winter, we'd, in effect, have no increase in the population. If we had more than a 4 percent loss, we would have a net loss of our population.

THE COURT: But in the '08-'09, what the Defendants are saying is that somebody just miscounted those 19?

THE WITNESS: Yes, and we contend that assumption. Mr. Tom Stehn is a very reputable scientist who has achieved high awards in the Fish and Wildlife Service, has been working with the Whooping Crane Recovery Team for several, or a couple of decades, and his information has never been contested. He is an honest man that does very good surveys. Sometimes it's difficult, they do them from the air, but he repeats the surveys every two weeks throughout the winter, so you get, in our opinion, a very accurate number of the number of birds.

THE COURT: What happens if the Defendants say 19 came back, 19 adults, more came back than left Aransas? Is that possible?

THE WITNESS: Um --

THE COURT: That's what they're saying. Is that right?

MR. FERNANDES: Yes, Your Honor, we're saying that they actually expected 247 birds the next year, based upon mortality numbers, and actually 264 came back.

THE COURT: Okay.

THE WITNESS: So there was only a loss of two birds during that time, from the time they left until the time they came back. And the argument is that that loss is too small. But in some years, other years, we have had very few losses during migration. It's not always an 8 percent number. That's an average.

THE COURT: Okay.

THE WITNESS: And our contention is that because Mr. Stehn is such an excellent biologist, and because these birds are so obvious, that if that number of birds were missing, somebody would be seeing them. If they were scattered all over the place, more people would be seeing them. Every time there's a lone whooping crane somewhere, we get calls, the refuge gets calls, "Have you lost one of your birds?" And he searched diligently with his aircraft for those cranes and simply couldn't find them. And there were no reports from other areas.

So the Whooping Crane Recovery Team believes the

information that we lost those 23 birds during the very bad winter of 2008-2009. That's the crux of the case.

THE COURT: I got it.

THE WITNESS: Uh-huh.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. Now, just to try to -- I hesitate sometimes to try to make something clearer.

A. Okay.

Q. But if 247 left at the end of the, or at the end of the 2008-2009 winter, and went back up north, then you would expect them to have a number of chicks. Is that right?

A. Of course.

Q. And then those chicks would be added to the 247 to provide the number that would be coming back.

A. Right.

Q. And --

THE COURT: What number of chicks do they usually have?

THE WITNESS: When I'm under pressure like this, I find it difficult to remember numbers, but say if there were a hundred birds --

THE COURT: You know what --

THE WITNESS: -- there will be twelve chicks.

THE COURT: -- you can come back any time if you want

to supplement. That's fine with me.

THE WITNESS: Okay.

THE COURT: But go ahead. How many do they have? One or two chicks per nest?

THE WITNESS: Oh, oh, a pair of whooping cranes lays only two eggs a year, and they usually raise one or two chicks. And --

THE COURT: So how many nesting pairs went north that year?

THE WITNESS: Okay. The year before, in 2008, during that breeding season, there were 92 pairs nesting in Wood Buffalo National Park. In 2009, after the drought, and after we believe these birds were lost, there were only 86 pairs that nested. The next year there were --

THE COURT: Wait a minute. There were how many before in the 2008?

THE WITNESS: Okay. In 2007, there were 94 pairs. In 2008, there were 92 pairs. And in 2009, the year after the drought, there were 86 pairs nesting. And the following winter, there were again 94. So there was a real dip in the number of breeding pairs following what we considered to be a very bad winter at Aransas.

Although, the number of chicks those 84 produced was very encouraging, and a good crop of chicks came back that fall. I forget how many there were. So that added up to the

total number of birds that were at Aransas in the fall of 2009, the chicks produced and the birds that survived in the summer.

THE COURT: Go ahead.

BY MR. BLACKBURN:

Q. Dr. Archibald, what happens if over a period of years the losses exceed the profits, if you will, in terms of the whooping crane recovery?

A. That's why we are very, very concerned, that should, in our opinion and in the opinion of the other experts on the water conditions, the crab conditions, which you'll hear a great deal about, if we don't have that fresh water inflow, we're going to have an ecosystem that is not healthy for the whooping cranes, that we'll have increased mortality in the winter, and the population will gradually decline. It's a very narrow margin of growth, considering the amount of mortality and the low production of the population. It's a very, very narrow margin.

Q. Now, how many whooping cranes are there, how many, for example, do you think are anticipated by the Recovery Team to come down this fall?

THE COURT: They're coming down already, aren't they?

THE WITNESS: Yes, yeah.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. Did you go out and see them recently?

A. Yes, I was out there on Friday, had a wonderful day. It was beautiful.
Q. And they're not -- are they all down here yet?
A. Probably not. And aerial surveys have not been conducted this winter, so we don't know how many are here.
Q. Okay. Is it, you know, just relative to the other crane flocks, if you assume roughly somewhere in the neighborhood of 300 might be coming back this year, how does that compare with other crane species in terms of the number of individuals?
A. Okay. The next rarest crane is the beautiful Japanese crane, that numbers about 2,800 birds. Above that is the Siberian crane from Russia at about 3,500 birds. And then there are a whole slew of endangered species between that number and about 8,000. That's our 11 species of endangered birds.

So if you consider a little village with 300 people, and that's it for the species, it becomes slightly more sobering. It's a very, very low number of birds. And any catastrophic event, for example, a spill at Aransas or a storm or whatever could really impact that population very negatively. We're not talking about that here, but that's one of the reasons the Recovery Team is very concerned about them and why we have put so much effort, so far unsuccessfully, into establishing four other populations of whooping cranes in other parts of the continent.

Q. And since you mentioned it, I might ask you about that very quickly. Could you describe your personal involvement and the International Crane Foundation's involvement with the alternative flocks that have been tried to be established in the wild?

A. Sure. In 1966, eggs were collected from the wild birds in Canada. As I said, they lay two eggs a year, but they usually only raise one chick. And so the governments of Canada and the U.S. decided it would be a good idea to establish a captive flock as a safeguard. So they went in in helicopters, collected maybe a dozen eggs, took them to Maryland to the Fish and Wildlife Service's Patuxent Wildlife Research Center and hatched them out. And by 1975, they started to breed in captivity. Today there are about 150 whooping cranes in captivity, and they breed quite well.

And it's from this captive population that we use birds for reintroduction programs, the first of which was in Idaho, that Your Honor mentioned earlier, that come to New Mexico. This started in '75, by putting whooping crane eggs in sandhill crane nests. Sandhills are abundant in the Rockies. And it was successful to the point that they raised the whooping cranes, migrated with them, but the whooping cranes all thought they were sandhill cranes and didn't want to whoop it up with a whooper, and so we didn't have a single pair form, and the experiment was discontinued.

Whooping cranes used to breed in Louisiana. There was a big population there, but we believe they were shot out, and the last birds died in the 1940s. And the Whooping Crane Recovery Team wanted to put them in Louisiana, but Louisiana wasn't ready, but Florida was, and we tried putting them in Florida. From 1993 we put out 289 birds that were raised in captivity. And today there are fewer than 20 alive.

We encountered so many problems in Florida. The water table gave out on us. There's just too big a draw from the human populations on the water table, and a lot of the wetlands collapsed. The whooping cranes go flightless every second year, they can't fly for six weeks. A wetland would dry up, they're flightless, and the predators got them, particularly bobcats.

The whooping cranes actually bred in Florida. We had ten chicks produced that fledged, but the rate of reproduction could not keep up with the rate of mortality. So it was obviously a failure, and we stopped putting eggs out there in 2004 -- or not eggs, young birds.

The third experiment has been in Wisconsin, to raise birds in captivity and teach them to fly behind ultralight aircraft and to fly with them to Florida. It's been on the media quite a bit. In addition, we released birds directly with the other cranes. And that program started in 2001, and we don't know if it's going to be successful. We're just working through that

program now. It shows some promise, but we're not there yet.

And then this year, in February of this year, ten whooping cranes were released in Louisiana to try to start another flock in Louisiana, a nonmigratory flock. And just this week 16 birds were sent from the captive breeding centers to Louisiana to release into the wild.

But these, I want to emphasize, are experimental populations. Our first two experiments, Idaho and Florida, failed, and we're by no means out of the woods with our Wisconsin and Louisiana experiments. We thought we're going to have this safeguard of these other populations, but after, you know, working since 1975, we don't have them yet. We have the captive flock, but we don't have these other flocks. We're continuing our efforts.

But the Crane Foundation then, and the Recovery Team took a look, especially after the crisis that we had in 2008-2009, we've got to do more to help make sure that this population that comes to Texas survives. And that's why we've hired Dr. Elizabeth Smith to work on this issue full time and why we became involved with The Aransas Project.

Q. And could you describe, from a, I guess really almost a, the life cycle standpoint, somewhat quickly, how this wild population functions between Canada and Aransas?

A. Whooping cranes are rather solitary cranes. They don't gather in big flocks like sandhill cranes. And on their

breeding grounds in Canada, the pairs are widely scattered in Wood Buffalo Park, in a huge wetland complex. We call this their breeding territory. And in the center of it, they'll have a nest and have their two eggs and raise their chicks. People can't go in there. There are no roads. You can't even go through it by boats. They weren't discovered until 1954.

And they leave there, and they go to Saskatchewan in small groups into the wheat fields and the marshes, and they stay there about a month or six weeks and build up their fat reserves before their long migration to Texas. And they come to Texas very quickly from the staging area in Saskatchewan, and they have their GPS set for the Aransas National Wildlife Refuge and wetlands around it.

They come straight back there, because that is their winter home. And each pair establishes, or each breeding pair establishes a territory, from 100, several hundred acres of wetland. Why do they do that? We believe that they do that to protect their food. The most important food items are the wolfberry and the blue crab.

And they drive other whooping cranes out of their territories. They have calls that you can hear for a couple of miles. And the reason they have those loud calls, is not to entertain us, but to threaten each other, to tell them to stay away from their territories.

Q. Can you give an example of that call?

A. "Whoop," and thus the name. A lot of people, including Mr. Fernandes, ask me, is it whooping crane or whopping crane or whatever. And I say, "Just remember Whoopi Goldberg. It's whooping crane."

Q. Thank you. I'm sorry to interrupt your discourse, because I was going to ask you to make another call later, which is the weep call. And could you do that now?

THE COURT: The what call?

MR. BLACKBURN: A weep call. I'll ask him to explain it.

THE WITNESS: I just wanted to explain the family structure. Whooping cranes are monogamous. They will divorce, they will take a new mate, but by and large they're very loyal to their mates, and they stay together for many years. And they're a real team, a pair of cranes. They collectively, or together they drive away other cranes out of their territories, and they share the duty of incubating their eggs and raising the chicks.

And when they arrive in Texas, this brown, cinnamon colored brown chick is with mom and dad, and they get on their territory. But the growth of the young bird is not complete. Its feathers will change during the winter to become pure white. This bird, I think it was likely photographed in January, would be my guess, so it's December.

And the chick's beak does not attain its full length

until later in the winter, and it seems to be tender, and these whooping cranes have to catch these blue crabs. And if they catch a large one, they have to smash it. And they grab it and they smash it with their beak into several parts, and the chick is standing there waiting to be fed.

And the chicks have a call, called a food begging call, or a weeping call, and it sounds like this, "whoop, whoop," and you can hear it for quite a distance. And this is telling the parent whooping cranes, "I'm hungry, I need food, please get a blue crab for me," or a whatever.

And this family remains intact through the winter, and the parents are lavishing care on their chick, if conditions are normal. And in the spring, they even migrate back together, together, but the chick, of course, leaves its parents as they begin the new breeding cycle.

But the strange thing that happened in, not only in the year of 2008-2009, during that drought, many whooping crane juveniles were observed without their parents, wandering around the National Aransas Refuge. And as Dr. Chavez will report in his testimony, if there's a food scarcity, the number one concern of the crane pair is to survive themselves. That's number one. Number two, if there's enough food, the chick can survive.

And it appears from the evidence that, actually Dr. Chavez has observed this happening, that the parents, if

there's a food scarcity, will hoard the food for themselves, and the chick leaves the parents searching for food elsewhere. So the family situation is broken up during that type of stress.

BY MR. BLACKBURN:

Q. Now, before I get any further in your testimony, I want to ask you about your experience with a bird named Tex, and kind of your role in the, I guess the development of breeding, I guess captive breeding programs. Could you explain that?

A. Well, a grave concern of ours is the genetics of the whooping cranes. Because they were reduced to just 15 birds, and DNA evidence suggests that they were reduced to actually only three reproductively active females.

Q. And that's back --

A. Back in 1940s. And so geneticists predicted that this population can never survive, because of inbreeding. And it appears that this population must have been very genetically healthy during, when it was reduced to such few birds, because the population has been fairly robust. But back in the 1960s, they were, before they started collecting eggs, there were only two birds in captivity. They were both wounded in the wild and taken to the San Antonio Zoo. And they only produced a single offspring, after producing many, many eggs and many failures. And the zoo director wanted to make sure that that offspring survived, so he raised it in his home. And it became

hopelessly imprinted on humans.

The Government tried for ten years to breed this bird with another whooping crane, from eggs collected from Canada, because it was so genetically important. But the bird refused all advances by whooping cranes. However, whenever a keeper went by, it would start dancing.

So I proposed that they would send it to Wisconsin and I would dance with it, which I did for six years. And finally, through artificial insemination in 1982, we have a chick. And that chick is a robust male, named Gee Whiz, who now is the father of generations of whooping cranes, many of which are back in the wild. And the genes from San Antonio Zoo are now on the wing.

Q. So --

A. End of story.

Q. So would it be fair to say the captive breeding of whooping cranes dates back to that experience?

A. The first captive whooping cranes were produced at the Audubon Park Zoo in New Orleans in the early '50s. But they never reproduced. Only their -- there was only one breeding pair, and none of the offspring reproduced.

Q. So the rest go back to Tex and that experience?

A. And the eggs collected from Canada.

Q. Right.

MR. BLACKBURN: Now, I'm not sure if I need to do

this, but I offer Dr. Archibald as an expert on whooping cranes.

THE COURT: No. Yes, of course.

BY MR. BLACKBURN:

Q. There is a picture of the whooping cranes, Exhibit 263, that is on the screen. Just to kind of complete some factual information, would you just describe physically what's shown in this photograph? I mean, how big is this bird? What are its dimensions?

A. It's a bird that's about five feet tall, an adult male. It has a wing span of 7 to 8 feet. Its voice can be heard for a couple of miles. They have an area of bare red skin on the top of their head and on their mustache, which they can expand and contract voluntarily, to indicate their emotional state. The red is expanded when they're aggressive or sexy.

And the juvenile, of course, has different plumage. It's brownish. It makes us easily -- it makes the bird easily recognized. And by adding up the number of juveniles, we know the productivity of the population.

Q. And I've heard the whooping crane described as an iconic species. What does that mean to you?

A. To me, the whooping crane is a symbol of survival, not only in United States, but around the world. I am working with a whole bunch of countries where there are enormous environmental problems on the habitats and on the birds, and we

always tell the story about the whooping crane, that you know, don't give up. Our birds were reduced to 15, but now they've come back, and we have almost 300.

There's hope. The whooping crane represents hope. And I think it would be a great tragedy in our country were we to lose these wild whooping cranes that come to Texas. And I think that Texas has a huge responsibility in keeping this bird around, and so that it always can be a symbol of survival and not a symbol of the opposite.

Q. How old do whooping cranes get to be?

A. In the wild, whooping cranes, on the average, live to be 15, but they can live up to 30 years. In captivity, they live much longer, because they have veterinary care and all kinds of food.

Q. And when do whooping cranes become sexually mature?

THE COURT: I'm sorry, how old do they get, on average?

THE WITNESS: Fifteen.

BY MR. BLACKBURN:

Q. And that's in the wild?

A. In the wild.

THE COURT: What about in captivity?

THE WITNESS: I don't know the average ages of our captive birds, but it's not uncommon for them to live in their twenties and thirties.

THE COURT: How old are they when they stop reproducing? Do you know?

THE WITNESS: We have birds that are reproducing in their thirties in captivity. In the wild, we have a bird that's 26 years old that is still bringing chicks to Aransas, that's banded, yes. But those are exceptional. You have a lot of mortality of younger birds.

BY MR. BLACKBURN:

Q. And just very briefly, historically, what was the range of the whooping cranes in, kind of where were they to begin with?

A. Okay. The whooping crane was a bird of the tall grass prairie marsh which extended across western Louisiana into Texas. That was a nonmigratory flock. And then there was a migratory flock that extended from the tall grass prairies of northern Indiana, through Illinois, Iowa, Minnesota, eastern North Dakota, into Saskatchewan in the Aspen parklands of Alberta. And that area, the whooping crane's range, became the number one target for European pioneers that drained the marshes and established the world's great food basket from the heart of our continent.

The last whooping crane was seen on the prairie marshes as a nesting bird in 1922 in Saskatchewan. But birds still came to Texas. Where did they nest? It wasn't until 1954 that they discovered the nesting grounds up in Wood Buffalo Park. And they used to winter from Chesapeake Bay to Mexico.

Q. Now, you mentioned the Whooping Crane Recovery Team, and I would like to have Exhibit 11 shown, please. And can you identify what is shown on your screen, which is Exhibit 11?
A. This is the International Recovery Plan of the whooping crane, of which I participated in creating in 2007. We had two former versions of this plan, the first of which was created in the 1970s. Soon after the Whooping Crane Recovery Team was formed when the Endangered Species Act was revamped in 1973, calling for recovery teams.
Q. And what is the agency that is shown at the top of the exhibit?
A. U.S. Fish and Wildlife Service.
Q. And did they publish this?
A. Yes.
Q. And, but did you take part personally in the creation and in the writing, in authoring this report?
A. I did.
Q. And was it prepared by the Recovery Team of which you are a member?
A. It was.
Q. Now, I'd like to just turn to the second page, or the inside page, and ask you, who actually signed this document? Can you make out -- I'm not sure you can make out the names or not, but at least the agencies, what two agencies signed this?
A. U.S. Fish and Wildlife Service, this is their Region 2,

southwest of Albuquerque, and the Executive Director of the Texas Parks and Wildlife --

Q. And --

A. -- in Austin.

Q. And I bet you can't read that name, can you?

A. Can you?

Q. I'm sitting here, I'm drawing a blank. I know who it is, I just can't recall it. But --

THE COURT: Is the top one Benjamin something?

MR. BLACKBURN: I think it's Robert --

THE WITNESS: Tuggle.

BY MR. BLACKBURN:

Q. No. Anyway, it's the Texas Parks and Wildlife. Is that right?

A. Yes.

THE COURT: We're looking at different lines. I'm looking at the top, when you and I were, I think --

MR. BLACKBURN: Oh, Benjamin Tuggle is the top.

THE COURT: That's who he and I were looking at.

MR. BLACKBURN: Oh, okay.

THE COURT: You were looking at the second line.

BY MR. BLACKBURN:

Q. Well, how about the name that was signed by Texas Parks and Wildlife?

A. I don't know.

Q. Yeah, that's what I thought.

THE COURT: Who is it? Robert who?

MR. BLACKBURN: I'll get the name, Your Honor. I'm just drawing a blank sitting here.

THE COURT: That's all right.

MR. BLACKBURN: George and I both suffer from nervousness on occasion here, so --

BY MR. BLACKBURN:

Q. Would you flip to Page 20, please. And I'd like to -- and if you could -- there you go. This is a selection from Page 20, as it's now being centered, from Page 20 of the Recovery Plan. And could you describe, Dr. Archibald, what this section of the Recovery Plan is about?

A. In the 1990s, LeeAnn Linam of the Texas Parks and Wildlife was a member of our Recovery Team. She repeatedly said to us, "You people are so concerned with captive breeding and establishing other populations, but the big problem is right here in Texas, and it's with fresh water inflow."

Her dad was the refuge manager of Aransas Wildlife Refuge, and LeeAnn grew up on the refuge. And she brought to our attention the --

MR. FERNANDES: Your Honor, I'm going to object to the hearsay of what Mrs., somebody from Texas Parks and Wildlife that's not here. We have no problem with him describing what's in the Recovery Plan, but if he has an

understanding why it's in the Recovery Plan. But when he goes on and on about what somebody from Texas Parks and Wildlife said during that period of time, we object on hearsay.

THE COURT: I'm trying to figure out about the report, like who he relied on in his reports, and is this accepted. I assume it was mandated from the Fish and Wildlife department.

MR. FERNANDES: Yes.

THE COURT: And that he had to interview various people to come up with this plan. So I'm not sure about hearsay on this. What do you think?

MR. FERNANDES: Yeah, we don't really have a problem with that, with those questions you just asked. But when he goes into a narrative about what somebody said, we have a problem with that. I think he can get to the same place on Q&A that doesn't get into hearsay.

THE COURT: What do you think?

MR. BLACKBURN: I think that he is explaining why they did what they did, as members of the Recovery Team. And it's the supporting and background information that led to this report. I think it's in.

THE COURT: I'm going to overrule the objection. Go ahead.

BY MR. BLACKBURN:

Q. You may continue with your discussion.

A. Okay. In summary, we consider, as the Recovery Team, a group of experts, that fresh water inflow is extremely important, as described here. And what we basically say is that the impacts are very, very critical on the wintering grounds, and it includes the watershed of the Guadalupe and San Antonio Rivers flowing down to the coast, needed to maintain the proper salinity gradients for the food of the whooping crane. And these inflows are critical in maintaining the productivity of the coastal waters to produce the food for the whooping crane.

THE COURT: Now, what is the primary diet of the whooping crane? Just, I want to make this clear.

THE WITNESS: On the breeding grounds, it's completely different from the wintering grounds, and on migration, it's completely different from either the breeding grounds or the wintering grounds.

On the wintering grounds, the diet is predominantly wolfberry in the early winter, when the wolfberry is in production in November and December, and blue crabs throughout the period that they're here.

They will also eat other things. A lot of those items are for lower food value, but the critical items, through years of research and observation at Aransas, are the wolfberry and the blue crab, both of which the production of those food sources is related to the salinity of the water and the volume

of the water.
BY MR. BLACKBURN:
Q. And in fact, if we could turn to Page 21 of the Recovery Plan, does the Recovery Plan specifically address the issues of blue crab? And I think we've looked -- and wolfberries. No, go ahead and come down, please, to the next one, to the bottom paragraph. Let's look at the last paragraph, please.
A. "Inflows are already at times insufficient and reduced over historic levels, leading to increases in mean salinity and decreases in blue crabs, the primary food of the whooping crane."
Q. Now, this is the Recovery Team writing -- when was this written?
A. This was -- the first Recovery Plan was written, I believe, in 1976, and it was revised in the 1980s, and this one is 2007.
Q. And was this written before the winter of 2008-2009?
A. Yes, because we had many years of drought, of less severe drought than during that winter, in our opinion, and we had heavy losses of whooping cranes during those periods of drought. When water levels were good, the whooping cranes, sometimes there was no mortality, or there would be maybe one or two. But during the drought years, we would have a spike in mortality of birds on the wintering grounds.
Q. And was this document prepared before this lawsuit was

filed and before ICF joined TAP?
A. Yes.
Q. So it would be fair to say it was not created in contemplation of litigation.
A. Yes.
Q. And was this, was there dissent within the Whooping Crane Recovery Team about this?
A. Never.
Q. And that's, what, ten experts essentially that are, that formed to come up with the recovery report?
A. Yes.
THE COURT: Can I ask you about the blue crab reduction of 8 percent in bad times? Can you give me like some idea of how big the blue crab population was and how big a difference 8 percent makes?
THE WITNESS: I don't feel capable of talking about that. There are other experts that are going to address that, if that's okay, Your Honor.
THE COURT: That's fine.
THE WITNESS: Okay.
THE COURT: I guess that was part of your report, though, somewhere.
MR. BLACKBURN: Right. The 8 percent, Your Honor, I think was the decrease in whooping cranes on the wintering ground. Did you, was there an 8 percent in this report that

you saw?

THE COURT: Yes. 8 percent decline in blue crab population.

MR. BLACKBURN: Oh, I'm sorry. You're right. There wasn't -- okay. You were reading ahead of me.

THE COURT: I'm always right, don't you know that?

MR. BLACKBURN: I will do my best to remember. By the way, it's Robert Cook with Texas Parks and Wildlife Department --

THE COURT: Thank you.

MR. BLACKBURN: -- who was the Executive Director who signed this document. We were --

THE COURT: Okay. I guess my, the question would be for whoever, whomever you call is if there are 20 billion blue crabs and there's an 8 percent decrease, how does that affect the whooping cranes. But if there's a limited number of blue cranes (sic), 8 percent reduction --

MR. BLACKBURN: We will have Dr. Montagna --

THE COURT: Somebody will tell me that? Okay.

MR. BLACKBURN: -- to talk about blue crabs in that context. And I think also --

BY MR. BLACKBURN:

Q. Well, let me ask you this, Dr. Archibald, how many crabs does a crane eat per day? Or is that Felipe Chavez's --

A. That's Felipe Chavez. But dozens.

THE COURT: Dozens?

THE WITNESS: Uh-huh.

BY MR. BLACKBURN:

Q. Now, I want to ask you a bit about whooping crane numbers and counts. Now, does the Whooping Crane Recovery Team rely upon the counts that have been done by the Aransas Wildlife Refuge over the years?

A. Yes.

Q. Who has done those? Who are those counts done by?

A. In the recent decades, they've been done by Mr. Tom Stehn, the Refuge Biologist, and the leader of the U.S. portion of the Whooping Crane Recovery Team since 1995.

Q. And could you briefly describe how these counts are undertaken?

A. Mr. Stehn flies in a fixed wing aircraft, with a pilot who is experienced in where these birds are, and they fly throughout the winter range, not only on the Aransas Refuge, but on neighboring wetlands, such as those on St. Joseph's Island and Welder Flats, where whooping cranes are wintering. They fly at several hundred feet. And because the whooping cranes are scattered in small groups, one bird, two birds, three birds, four birds, whatever, and because they maintain traditional territories, it's quite easy to identify the different groups on their territories. And under normal conditions, they don't move out of their territories, so the

chances of double counting are reduced. And these surveys are, in recent years, have been done twice a month through the winter, from December, January, February, March. So that would be eight surveys per winter in the normal year.

Q. Now, could you briefly describe your personal experience with aerial surveys?

A. Yes. Cranes live in huge, wide open low areas, often with tall vegetation, and they're very difficult to see, although large birds, in many cases from the ground, especially if you're in a boat. And from the air, they are extremely obvious. They're huge, white birds. And when you develop a search image for them, they're readily determined from swans or pelicans or egrets, and you can make very accurate counts.

I've participated in hundreds of hours of aerial surveys of cranes in other continents. I have not participated with Mr. Stehn in his surveys. Other members of the Recovery Team have, including Dr. Chavez. And Tom is a very thorough person. Sometimes if the weather's bad, he's the first to admit that the survey had difficulties, and he repeats it. And by that repetition, through the winter, comes up with a number which we believe is reliable.

Q. And within the Recovery Team, has there ever been any discussion about, that you think these numbers are not reliable, in any way?

A. Never.

Q. And are you familiar with the literature on whooping cranes?
A. Yes.
Q. And prior to this litigation, have you ever run across anything in the literature that challenged the accuracy of these counts?
A. No.
Q. Now, I'd like to turn your attention to the, a map of the Aransas Refuge, which is Exhibit 1. And again, if you could hone in on that a bit.

What I'd like you to do is just to describe for Judge Jack what is shown in this exhibit, which is from the International Recovery Plan, Page 15.
A. Well, going from the right to the left, we have the Coastal Islands, the Barrier Islands, San Jose Island, and Matagorda Island. The crosshatch area indicates where the cranes are. The Aransas Refuge includes part of Matagorda Island and the, what we call the Black Jack Peninsula, a big peninsula on the mainland. And there are more cranes on what we call the elder -- Welder Flats, just east or to the right of the word San Antonio Bay.

The dotted line indicates the critical habitat for the whooping crane, a boundary which was established before the population increased and territorial pairs started to set up residence outside the critical habitat. I'm not sure exactly

where that critical habitat line is today.
Q. But this is from the 2006 plan?
A. Yeah, right.
Q. Now --
THE COURT: I'm sorry, different from what?
MR. BLACKBURN: I think he was saying he's not -- he said that the cranes went out, are now outside of the boundaries, and he's not sure if it's been expanded or not.
THE COURT: Okay.
BY MR. BLACKBURN:
Q. Now, during the winter of 2008-2009, are you aware of the mortality counts that were compiled by Tom Stehn?
A. Yes.
Q. How many birds were found by Mr. Stehn to have perished during that winter?
A. I believe four carcasses were recovered.
Q. And how many total birds were reported as mortality?
A. 23.
Q. I'm sorry?
A. 23.
Q. And of those, how many were juveniles?
A. 16.
Q. Now, I'd like to have Exhibit 10, please.
THE COURT: Of the four carcasses, were any of those juveniles?

THE WITNESS: I believe two were juveniles and two were adults.

BY MR. BLACKBURN:

Q. Now, let me ask you this. Over the years, have many carcasses been recovered in years when there were reported mortality?

A. I know some carcasses have been recovered and some have not, and I don't know the ratio.

Q. Okay. We will ask others about that. I need to stay to my script.

Could you identify what is in Exhibit 10?

A. This, again, is the refuge and the coastal islands showing the territories of the whooping crane. The original territories were on the Black Jack Peninsula, and those are smaller, along the Intracoastal Canal. Apparently those are the prime real estate from which birds moved out as the population increased. They colonized the San Jose Island and Matagorda, and now they're up into the Welder Flats. So the population range is expanding as the numbers have expanded.

Q. So what does it mean to have a territory?

A. It means that this is an area that's a piece of real estate that a pair of cranes defends against the intrusion of other cranes. And we consider that to protect their food source.

Q. And could you describe the use of a territory year after

year by a pair of cranes?

A. From 1976 through 1988, I believe, all of the juvenile whooping cranes were color-banded at Wood Buffalo National Park. The Recovery Team wanted a lot of questions answered about when these birds started to breed, the rate of mortality at different years of life, and the tenacity of birds to their territories. And we found that the same birds come back to the same territories year after year, generally speaking.

Q. So it's literally like a piece of real estate that they have some ownership interest in.

A. Exactly. In addition, we found that their offspring, particularly the males, establish territories near their parents' territory.

Q. So during the winter, we had that image earlier of the two cranes and the juvenile. How do they use that territory during a normal winter?

A. The area of the territory they use the most is the area with a very good open view, whether it's shallow water or low vegetation. The wolfberry is a low vegetation plant, and they will walk around, as a family group, searching for wolfberries, which they grab. Or they'll go into other areas where there's grass and blue crabs and search for the blue crabs and grab them, kill them, and divide them, feed the chick.

Throughout the day, a family of whooping cranes is walking around their territory. I think they spend something like 75

percent of their time looking for food in a given day.
Q. And --
A. And they spend the night on their territories.
Q. And in terms of, you used a term, I think, site tenacity. What does that mean?
A. That means holding on to the same piece of land over a long period of time. They're tenaciously holding on to that real estate.
Q. And which of the adults defends that territory?
A. Both of the adults defend it, but the male more so than the female.
Q. And over the course of the winter, does the behavior of the juvenile with the adults change, or does it remain the same?
A. In the early winter, the adults spend proportionately more time feeding the juvenile. As the juvenile matures and learns to feed on its own, less time is spent feeding the juvenile, and it becomes slightly more independent.
Q. And --
A. Although it still stays with its parents throughout the winter, under normal circumstances.
Q. And can you describe to Judge Jack how the relationship between parents and chick changes over times during food shortages?
THE COURT: I think he did that. Didn't you?

THE WITNESS: Yeah.
MR. BLACKBURN: Just wanted to make sure --
THE COURT: The chick has to wander away because the first goes to the couple.
MR. BLACKBURN: You got it.
THE WITNESS: Right.
THE COURT: That was what he said.
THE WITNESS: Right.
MR. BLACKBURN: Excellent.
BY MR. BLACKBURN:
Q. Then let me ask you kind of the last area I want to inquire about, and that's your work with International Crane Foundation around the world. You earlier described the International Crane Foundation being concerned about fresh water inflows in Texas. Does ICF have experiences anywhere else in the world with regard to fresh water flows and crane conservation?
A. Our primary program working on fresh water flows is with the Zambezi River in Mozambique. This huge river that originates in Angola and Zambia flows into the Indian Ocean at an enormous delta, which was one of the greatest wildlife areas in Africa and supported a population of 2,500 wattled cranes, the most endangered crane of Africa.
In 1976, the Government of Mozambique, supported by the Portuguese at that time, built a huge dam called Cahora Bassa

in the mountains and blocked the river. The delta dried up. The wildlife declined, and the cranes decreased from 2,500 to about 60 birds.

We started work there in 1973 and have continued to present, and are working with the dam operators and with the local people living along that river, for a win-win, so that the energy needs are met, and so that what we call environmental flows are provided to simulate the normal flooding of that delta.

And the wildlife is recovering. It's been a sociological project as much as a hydrological one, because we had to go from village to village talking about the good old days when the floods were there and they could plant their crops, and they all had to move into this little stream of water, that was now flowing through the center of the delta.

But it's a very good example of one of the poorest countries in the world developing a solution to a crisis where both sides are happy. And I hope that can be done here in Texas, too.

Q. And sort of to end your testimony, do you have an opinion that you hold with a reasonable degree of scientific certainty as to whether or not fresh water inflows are necessary to the continued survival of the whooping crane on its wintering ground?

A. From all the evidence we have over years of information,

they're absolutely critical.

Q. So your opinion is?

A. That fresh water inflow is critical to the long-term survival of the whooping crane in Texas.

Q. Let me, may I ask one more thing, and then I'm going to pass the witness. Dr. Archibald, are you scheduled to leave the country after you testify here?

A. Yes. I fly to North Korea on Wednesday.

MR. BLACKBURN: And so, Your Honor, I would ask, he's been cross-designated, I think we've cross-designated each other's experts. I would ask that if there are any questions, that the cross-examination be extensive, so that Dr. Archibald could be excused.

THE COURT: Any problem with that?

MR. FERNANDES: No, Your Honor. In fact, we think that that makes a lot of sense, with all the witnesses here, to move it forward.

THE COURT: That will be great. Thank you.

MR. BLACKBURN: Thank you, Your Honor. Pass the witness.

THE COURT: What are you going to do in North Korea? Not sightseeing, clearly.

THE WITNESS: A lot of cranes. This beautiful red crown crane used to winter in North Korea. And up until 1990, the Soviet Union gave free fertilizer to the people in North

Korea. And after that, the new Russian Government charged them, and they couldn't pay it, so there's widespread starvation. And all the cranes are either eaten or left and appeared on the demilitarized zone between North and South Korea where they are today, about a thousand birds. And there are very few birds, if any, left in North Korea.

But the South Korean Government wants to develop the demilitarized zone into Reunification City, putting up factories to provide jobs for North Koreans, thinking that reunification is going to happen eventually.

So the habitats for wildlife will be destroyed if that urban development happens. So we are working in North Korea, and have been for several years, in this valley where the cranes used to be to help the farmers with organic farming techniques.

And we have a pair of captive cranes used as decoys to attract the wild cranes to come back. And the agricultural production has increased, and the wild birds have started to come back. So I go there every year, with the blessing of the U.S. Government, to bring funding to support the farming activities and organic farming.

THE COURT: Must be very satisfying.

THE WITNESS: It is. It is. Very interesting.

THE COURT: Mr. Fernandes.

CROSS-EXAMINATION

BY MR. FERNANDES:

Q. Dr. Goldberg (sic), I thought when I asked you what was the correct pronunciation of the crane, you told me to think Whoopi Goldberg, not Hoopi Goldberg. But let's start by talking about your role on the Recovery Team. Hasn't the Recovery Team identified probable causes of death at the Aransas Refuge for the fifty-year period 1938 through 1987?

A. A portion of the mortalities are determined, but many are not.

Q. Okay.

THE COURT: 1938 to what?

MR. FERNANDES: 1938 to 1987.

THE COURT: All right. Thank you.

BY MR. FERNANDES:

Q. Let's start by looking at the 1994 Recovery Plan, DX 155.

THE COURT: Move the toggle. Is this to your own computer, from your own computer?

MR. FERNANDES: Yes.

THE COURT: There.

BY MR. FERNANDES:

Q. Weren't you a member of the Recovery Team when this Recovery Plan was prepared?

A. Yes.

Q. And when this Recovery Plan was prepared, didn't you provide input?

A. Yes.
Q. And let's look at Pages 17 and 18 of the 1994 Recovery Plan. Do you see there where it says between 1938, and this space here, 1986, 187 whooping cranes are known to have disappeared from the wild population. And it says, "The cause of the factors underlying this substantial mortality remain largely unknown, but it is clear that a high priority needs to be placed on identifying the sources of mortality and implementing remedial actions." Do you see that?
A. Yes.
Q. And then doesn't this 1994 go on to identify probable causes of death on that period of time 1938 to 1987 as shooting, avian tuberculosis or a closely related disease, birds that arrived injured at Aransas that were believed to be shot during migration, avian predation, and cranes arriving at the refuge with a trauma injury following a fall migration?
A. Yes.
Q. Now, during this approximate fifty-year period of time, weren't probable causes of death determined by examining a carcass?
A. Those that were found.
Q. Let's look at the --
THE COURT: Well, how many -- do you have any idea how many carcasses were found of the 187?
MR. FERNANDES: This, I think, makes reference to

eight earlier in the document.

THE COURT: Is that about right?

THE WITNESS: It says nine.

MR. FERNANDES: I'm sorry, I stand to be corrected.

BY MR. FERNANDES:

Q. Let's look at the, let's look at the DX Exhibit 102, which is the March 2007 Recovery Plan that you were shown by Counsel. And I believe you testified you were not only a member of the Recovery Team when this was drafted, but also you provided input.

A. Yes.

Q. Now, the principal drafter of this Recovery Plan, at least insofar as it related to Aransas, was Mr. Tom Stehn, was it not?

A. Yes.

Q. In fact, Mr. Stehn took the, took the lead on drafting the portion that related to Aransas, and Mr. Johns, Brian Johns would have taken the lead with respect to that portion that related to Canada. Correct?

A. Yes.

Q. And so remind me again what your input was in this plan, what portion of it that you had input in.

A. My portion primarily had to do with the captive flock and reintroduction efforts, although we all reviewed the entire document.

Q. Let's look at Page 5 of the March 2007 plan. Do you see this statement, "Few carcasses are ever found, thus no known causes of mortality can be attributed to a high percentage of losses." Do you see that?
A. Yes.
Q. Don't you agree with the statement that because few carcasses are ever found, no known causes of mortality can be attributed to high percentage of losses?
A. I think that what the meaning of that statement is is that the ultimate cause of mortality, was it a predator, was it a disease or whatever, is often unknown, because we can't find the body. But there are circumstances in the habitat that could have led to the weakening of birds that would have made them very susceptible to certain types of mortality.
Q. Let me ask the question again. Don't you agree with the statement in the Recovery Plan that "Few carcasses are ever found, thus no known causes of mortality can be attributed to a high percentage of losses"?
A. Yes.
MR. BLACKBURN: Objection -- well, never mind.
BY MR. FERNANDES:
Q. Now, let's look at the rest of the paragraph. In the March 2007 Recovery Plan, weren't probable causes of death identified to include shooting, avian tuberculosis, shooting injuries sustained during migration, avian predation, and

nonshooting trauma injury following fall migration?
A. Yes.
Q. Now, would nonshooting trauma injury following fall migration include a crane that injured its leg prior to ever arriving at Aransas?
A. Would you repeat that?
Q. Sure. With this, I'm looking at the March 2007 Recovery Plan. I'm focusing on that last probable cause of death, nonshooting trauma injury following fall migration. And my question is, would that include a crane that injured its leg while migrating to Aransas, and the injury occurred before it even got to Aransas?
A. Possibly.
Q. And would avian predation, would that include a crane that after it got to Aransas was attacked and killed by a predator?
A. Very interesting. Predators have a way of determining a bird that is diseased or otherwise stressed. And they will zero in on that victim. A bird that's normal, alert, is much less prone. So in this list of mortality, avian tuberculosis, for example, avian predation, could both be related to environmental stresses.
Q. My question is -- I'll try to ask it again. Would avian predation include a crane that was attacked by a predator at the Aransas Refuge?
A. Yes.

Q. In March of 2007, this Recovery Plan, weren't the probable causes of death identified by examining carcasses?
A. Yes.
Q. In the March 2007 Recovery Plan, were probable causes of death of whooping cranes ever identified to include water diversions?
A. Not directly.
Q. Let's go on to DX 126. Have you ever seen DX -- and by that I mean Defendants' Exhibit 126, which appears to be Mr. Stehn's July 2011 report?
A. Yes.
Q. Now, isn't this the report, the July 2011 report that Mr. Stehn prepared reporting events from the winter 2010-2011?
A. Yes.
Q. Let's look at Page 24 of this report. Do you see there on Page 24, he says no carcasses were found and cause of deaths was unknown?
A. Yes.
Q. So this is a Fish and Wildlife document now. Right? And what it says is kind of consistent with the Recovery Plan, no carcasses were found, and therefore, you can't determine cause of death?
A. Yes.
MR. BLACKBURN: Your Honor, if you would excuse me for a second, I want to bring something to your attention, and

we may not be handling it correctly, under the way you look at things. We've made an agreement that exhibits that have not been admitted into evidence may be used on cross-examination. This is one of those, and I just, I wanted to call that to your attention to let you know that we had made that agreement. That may not be --

THE COURT: This has not been admitted?

MR. FERNANDES: No, because I thought this is cross --

THE COURT: Well, I think you probably better offer it if you're going to use it.

MR. FERNANDES: This is the dilemma we're in.

THE COURT: You can't show nonadmitted exhibits to me.

MR. FERNANDES: Okay. Then we'll admit it.

THE COURT: You'll offer it?

MR. FERNANDES: Yes.

THE COURT: What's the number?

MR. FERNANDES: The number is 126.

THE COURT: Defendants' 126 is admitted, if there's no objection.

MR. BLACKBURN: No objection.

THE COURT: Okay. Would you get one of that --

MR. FERNANDES: Sure.

THE COURT: -- for Ms. Cayce, someone on your team?

MR. FERNANDES: I'm sorry?

THE COURT: Provide her with 126, please.

MR. FERNANDES: Oh, yes. I'm sorry.

(Court and Clerk conferring off the record.)

BY MR. FERNANDES:

Q. Now, haven't you been assisting in the creation of Recovery Plans since 1990?

A. Yes.

Q. And isn't it true that in the Recovery Plans, a determination has never been made regarding the probable cause of death of a crane when a carcass was not found and examined?

A. Yes.

Q. And isn't TAP's expert, Mr. Chavez-Ramirez, a member of that Recovery Team?

A. Yes.

Q. And hasn't Mr. Chavez-Ramirez attended Recovery Team meetings?

A. Yes.

Q. And at those meetings, you don't recall, do you, Mr. Chavez-Ramirez ever saying he could determine cause of death of a crane without a carcass?

A. I don't recall him ever saying that.

Q. And before this lawsuit was filed by TAP, isn't it true that you never heard anyone say that they could determine the cause of the death of a whooping crane without examining the

carcass?
A. Yes.
Q. Yes, you never heard that being said?
A. Yes.
Q. Now, you do understand that necropsies were performed on two carcasses that were found during the winter of 2008-2009?
A. Yes.
Q. And I believe you're a biologist by training?
A. Yes.
Q. And don't you believe that -- but you don't believe that you have the experience, training and expertise to review a necropsy report and give a professional opinion on cause of death of a whooping crane, do you?
A. I'm not a pathologist.
Q. Don't you agree that you --
THE COURT: If there's a necropsy report, why would you need anybody else to testify?
MR. FERNANDES: Because what we'll see, when Dr. Stroud comes in the comments section, in terms of, on the comments section, understanding of the manifestation of the disease, it's all described in the comments section of the brief. What they're doing in this case, just so you, just so it's real clear where the rubber meets the road, Dr. Chavez-Ramirez takes one word, and it says emaciation, and he says, see, therefore the cranes are emaciated. But the

pathologist's explanation of what caused emaciation is what we're fighting about in this case. And only -- if you have --

THE COURT: Well, do you have the pathologist's report?

MR. FERNANDES: Yes.

THE COURT: And what is it -- is that the one that had the infection?

MR. FERNANDES: Yes.

THE COURT: And that caused the emaciation?

MR. FERNANDES: Yes.

THE COURT: According to the pathologist.

MR. FERNANDES: Yes.

THE COURT: Is that what the pathologist said?

MR. FERNANDES: Yes.

THE COURT: Okay.

MR. FERNANDES: Okay.

THE COURT: It's just a matter of credibility. I can figure that out.

MR. FERNANDES: Okay.

MR. BLACKBURN: Your Honor, before we go further, I believe that there have already been used a couple of other exhibits that had not been admitted as well.

THE COURT: All right.

MR. BLACKBURN: I believe it's 102, 155 and 319. And 155 and 319 are the same.

MR. FERNANDES: And I apologize, because when we prepared these examinations, we had that agreement, and I was not aware of the Court's position in that regard.

THE COURT: You want to offer those at this time?

MR. WAITES: And 75.

MR. BLACKBURN: Those are DX 102 --

THE COURT: All right.

MR. BLACKBURN: -- DX 155 --

THE COURT: All right. DX 102, 155 and 319 are admitted.

MR. FERNANDES: Move to admit.

MR. WAITES: And 75, you did on the --

THE COURT: And 75?

MR. BLACKBURN: And 75.

THE COURT: Is that all right?

MR. FERNANDES: We will withdraw 75.

THE COURT: Have you used it already?

MR. FERNANDES: Yes. We'll admit it, if the Court --

THE COURT: I'll admit it. Thank you.

BY MR. FERNANDES:

Q. Now, do you understand that TAP's theory in this case is that 23 whooping cranes died during the winter of '08-'09 because blue crabs and wolfberries were allegedly not very abundant?

A. I understand that that, there is a correlation.

Q. Now, I believe on direct examination you said the most important food for the cranes is the wolfberries and the blue crabs. But your opinions in that regard are based solely upon the work that's been done of Mr. Chavez-Ramirez and Mr. Stehn. Correct?

A. And other biologists, particularly Robert Porter Allen, who studied the birds in the 1940s, followed by Mr. Hunt. So it's really 60 years of observations.

Q. Now, doesn't the Recovery Plan describe the diet of the crane?

A. Yes.

Q. Let's go back and look at Exhibit 102, the March 2007 Recovery Plan. And please turn to Page 8.

THE COURT: I'm sorry, the date of that report? This is the --

MR. FERNANDES: This is the March 2007 Recovery Plan.

BY MR. FERNANDES:

Q. On Page 8, it starts out by saying the whooping cranes are omnivores, or omnivorous. Do you see that?

A. Yes.

Q. Does that mean that they can and do eat a lot of things?

A. Yes.

Q. Okay. Let's look at what the Recovery Plan says about the cranes' diet while they're at Wood Buffalo in their summering grounds. Do you see there where it says in the summering

grounds, they eat insects, frogs, rodents, small birds, minnows and berries?

A. Yes.

Q. And do you agree with that statement?

A. Yes.

Q. Let's see what the Recovery Plan says with respect to when the cranes, what they eat when they're migrating to and from Wood Buffalo. Now, when they're migrating to Wood Buffalo, that says, does it not, that they eat frogs, fish, plant tubers, crayfish, insects and agricultural grains?

A. Yes.

Q. So just so we're real clear, while the cranes are summering in Wood Buffalo, or migrating to, back and forth from Wood Buffalo, they don't eat wolfberries or blue crabs, do they?

A. No.

Q. And aren't the cranes usually wintering at Aransas for approximately seven months a year?

THE COURT: How much? Did you say seven?

MR. FERNANDES: Seven.

THE COURT: Seven? I don't --

THE WITNESS: Four months.

BY MR. FERNANDES:

Q. Well, don't they begin to arrive in October and leave about April?

A. Most of the birds arrive, I think, from mid November on. A few will come earlier, and most of them leave in early April, I believe.
Q. And by that January, February period of time, they all should be here, shouldn't they?
A. Right.
THE COURT: So half a year, their diet is something else.
THE WITNESS: Right.
BY MR. FERNANDES:
Q. Now, I'm -- isn't the wolfberry crop, when they get to Aransas, usually over by the end of the year, by December?
A. Most of the wolfberry's fruits are available in November and on into December. You're right.
Q. And then by the end of December, no wolfberries? On an average year.
A. Apparently.
Q. And so you have January, February, March and April, no wolfberries. Right?
A. Right.
Q. Let's look at what the Recovery Plan says happens in December. Let's go to Page 8, please. On Page 8, are you with me, where it says, "In December and January, tidal flats typically drain as a result of lower tides, and the birds move into shallow bays and channels to forage primarily on clams."

Do you see that?
A. Yes.
Q. Let's focus on that statement, "Tidal flats typically drain as a result of lower tides." Doesn't that mean what's happening is when those tides start to drop and the levels of the water go down, the blue crabs are no longer abundant in the salt marsh, are they?
A. I'm going to have to refer technical statements on this to Dr. Chavez, who has more experience than I do.
Q. But in any event, what happens in December, according to the Recovery Plan, the cranes then have to go, move into the shallow bays and channel to forage primarily on clams. Do you see that?
A. I see that.
Q. And is it your testimony that you don't know whether or not that occurs because blue crabs are generally not abundant during January and February of any given year?
A. My understanding is that the blue crab population decreases with the lowered tides.
Q. And so the tides basically impact blue crab abundance. Correct?
A. To some extent.
Q. And when those tides go down, those north winds come out and blow the water out of the marshes, it reduces the blue crab abundance in those marshes, does it not?

A. (No response.)

THE COURT: I got it. Go ahead.

MR. FERNANDES: Okay.

BY MR. FERNANDES:

Q. If the wolfberry crop is gone by December and blue crabs are not very abundant because of low tides, don't these opportunistic foragers begin to eat other items, food items?

A. I would rather Dr. Chavez answer those questions, because I don't have personal knowledge of the abundance of these different food items through the winter.

Q. You're not aware, are you, of the nutritional value of these other food items?

A. Just what I've read, that the blue crab is of much greater nutritional value than the other food items, and that according to some of the literature I've read, there could be an energy loss in searching for some other food items.

Q. Now, you've never performed an energetics calculation or created a model to determine the nutritional value of the various food items that the cranes eat, have you?

A. No.

Q. And in your expert report, you say the Whooping Crane Recovery Team is a vigorous scientific body that for nearly four decades has commissioned and reviewed research on what could be done for the whooping cranes. But isn't it a fact, sir, that the Recovery Team has not engaged in or commissioned

any study to test Mr. Stehn's long-held hypothesis that blue crabs (sic) can only survive if blue crabs and wolfberries are abundant?

THE COURT: Wait a minute. You said that wrong, I think.

MR. FERNANDES: Okay. Let me try it again.

MR. BLACKBURN: I agree, Your Honor.

MR. FERNANDES: Let me try it again.

THE COURT: I think you're trying to say that whooping cranes only survive. You said "blue crabs only survive."

MR. FERNANDES: All right. Thank you. That's probably because I had too long of a question. Let me try it again.

THE COURT: Okay.

BY MR. FERNANDES:

Q. Isn't it a fact that the Recovery Team has not engaged in or commissioned any study to test the hypothesis that the whooping cranes can only survive if blue crabs and wolfberries are abundant?

A. Back in the 1990s, early 1990s, we met Dr., or Felipe Chavez, who was a graduate student at the time at Texas A&M. And we encouraged his research on this very topic, and he did a beautiful doctorate study on food availability at Aransas, and will talk in great detail about it. But it was upon the

recommendation of the Whooping Crane Recovery Team, and support from various sources, that that was done, because we realized that was a very important study.

Q. You're referring, are you not, to the work of Dr. Chavez-Ramirez when he was a student working under Dr. Slack at Texas A&M?

A. Exactly.

Q. In connection with his dissertation?

A. Yes.

Q. So let me ask the question again. Has the Recovery Team ever engaged in or commissioned any study to test the hypothesis that whooping cranes can only survive if blue crabs and wolfberries are abundant?

A. As far as I can recall, we never engaged in a study -- we never had that exact wording. We were very concerned to learn more about the food of the whooping crane and the relationship, seasonality, and to fresh water inflow, et cetera, which is what Dr. Chavez has studied. And so I think the frame of reference that we had embraced what you just said.

THE COURT: Did you rely on Dr. Chavez-Ramirez's study --

THE WITNESS: Yes, very much.

THE COURT: -- dissertation --

THE WITNESS: Yes.

THE COURT: -- to come up with your opinions about

the feeding habits of the whooping cranes?

THE WITNESS: Yes, very much.

THE COURT: Okay.

THE WITNESS: Uh-huh.

BY MR. FERNANDES:

Q. Haven't there been years when Mr. Stehn reported low or no crane mortality, when blue crabs were reported to be not very abundant?

A. I can't recall. But I'm sure that Dr. Chavez would know the answer to that.

Q. Have you looked at the 2008-2009 report by Mr. Stehn on his observations from the winter of '09-'10?

A. Yes.

Q. Weren't the, wasn't the blue crab count in 2009-2010, the capture rate lower during the winter of 2009-2010 than it was in the winter of 2008-2009?

A. I don't recall.

Q. Okay.

THE COURT: When you're talking about the capture rate, what are you talking about?

MR. FERNANDES: Of -- Mr. --

THE COURT: Regular people that are catching blue crabs?

MR. FERNANDES: No, no. I'm sorry. Mr. Stehn does what's called a transact, where once a month he walks through

the marshes for an hour, and he determines how many blue crabs are out there, and that's his survey, and we'll do that with another witness.

THE COURT: That would be best.

MR. FERNANDES: Okay.

THE COURT: Thank you. I just wanted to know what you were talking about.

MR. FERNANDES: Yeah. Yeah. I apologize.

THE COURT: Okay. Thank you.

BY MR. FERNANDES:

Q. Let's move on to another subject. Let's go to, I believe its -- is 123 in?

(Counsel conferring off the record.)

MR. FERNANDES: We're going to have to offer that then. Plaintiffs (sic) move to offer DX 123. And again, Judge, we'll clean this up over lunch --

THE COURT: 123?

MR. FERNANDES: Yes. I apologize, because of the agreement, we'll clean this issue up over lunch.

MR. BLACKBURN: Are you offering on our behalf?

THE COURT: No, he's offering it on his behalf.

MR. BLACKBURN: He said "Plaintiffs offer."

MR. FERNANDES: It's DX 123.

MR. BLACKBURN: Okay.

MR. FERNANDES: Defendants' Exhibit 123.

THE COURT: It's admitted.

MR. FERNANDES: DX 123 is Mr. Stehn's paper from, the Stehn-Taylor paper.

(Counsel conferring off the record.)

MR. FERNANDES: I'm sorry. Is that in? I'm sorry, Counsel.

THE COURT: I admitted Defendants' 123.

MR. FERNANDES: Oh, it's in. Okay, I'm sorry. I missed it.

THE COURT: That's all right.

MR. FERNANDES: Thanks.

BY MR. FERNANDES:

Q. Sir, let me show you what's been marked as Defendants' Exhibit 123.

A. Yes.

MR. FERNANDES: Could you pull this up a little bit more, so he could see it? No, no, the top half. Okay. There you go.

BY MR. FERNANDES:

Q. Weren't you in attendance when Mr. Stehn presented this paper to the North America crane workshop in October of 2008?

A. Yes.

Q. Okay. Let's look at Page 149. Do you see there where it says, "Movements also increase when cranes are forced to fly to fresh water ponds to drink, when marsh salinities exceed 23

parts per thousand"? Do you see that?
A. Yes.
Q. And do you see there, he quotes two published articles, Allen 1952, Hunt 1987, and then he quotes Chavez-Ramirez, unpublished. Do you see that?
A. Yes.
Q. Haven't you read Allen?
A. Yes.
Q. Okay. And isn't Allen one of the respected early biologists who did field studies involving these cranes?
A. Yes.
Q. And isn't it true that Allen does not support any such claim?
A. I believe -- I believe that Allen says that they move to fresh water ponds, but I don't recall him indicating the parts per million of salinity that forced them to do so.
Q. And haven't you also read that Hunt article that's referenced there, the 1987 Hunt?
A. Have I -- I've read it, yes.
Q. Okay. And isn't it true that the data of Hunt does not support any such claim?
A. I can't recall.
THE COURT: Any such claim as what?
MR. FERNANDES: The claim that basically the cranes need to seek fresh water when the salinities reach 23 parts per

thousand.

MR. BLACKBURN: Your Honor, is the -- I'm trying to understand the cross-examination. Is Dr. Archibald, about an article that someone else wrote about the sources that someone else claimed?

MR. FERNANDES: Well, what's going to happen -- I'm going to the Recovery Plan next, and this same statement is stated in the Recovery Plan, so I'm trying to figure out what the source and support is of the statement in the Recovery Plan.

THE COURT: Well, hadn't you better ask the witness that's going to testify about that?

MR. FERNANDES: I'm sorry?

THE COURT: Hadn't you better ask Dr. Stehn or Mr. Stehn?

MR. FERNANDES: But we can't get Mr. Stehn. That's the problem here, because Fish and Wildlife Service will not permit Mr. Stehn to testify, and that's why the --

THE COURT: Did you subpoena him?

MR. FERNANDES: Yes, we did. Both sides have tried to compel his appearance, but obviously they have governmental provisions which prevent us from taking a deposition of a governmental employee. And that's the position they took.

THE COURT: Where is he located?

MR. FERNANDES: I believe he's --

MR. MUNDY: Austwell, I think.

MR. FERNANDES: Yeah, I believe he's in the Aransas area. And that's why --

THE COURT: Have you issued a subpoena for trial?

MR. FERNANDES: We have not.

THE COURT: Okay. Well, I never saw any dispute about that. Why don't you just issue a subpoena, and let's have somebody file something.

MR. FERNANDES: Okay. We'll --

THE COURT: Wouldn't that be --

MR. BLACKBURN: We'd be happy to join in on it.

THE COURT: Wouldn't that be the right thing to try anyway?

MR. FERNANDES: Yeah. I mean, we both have been trying to --

THE COURT: And let's have a little hearing, see why he can't show up.

MR. FERNANDES: Yeah, yeah. Both sides have basically tried to get him here.

MR. BLACKBURN: And we'll, we would join with the Defendant in bringing a request.

THE COURT: Well, that's good. All right. Let's do an instanter subpoena and see what happens. Okay?

BY MR. FERNANDES:

Q. In any event, let's go to, back to the Recovery Plan,

Exhibit 102. This is the March 2007 Recovery Plan that we've been talking about?

A. Yes.

Q. And if you look, is it -- and we talked about Mr. Stehn's one of the principal drafters. Let's look at page -- let's pull up Page, I guess it's 144. Now, this claim --

THE COURT: What Exhibit number is this?

MR. FERNANDES: This is Exhibit 102, the March 2007 Recovery Plan.

BY MR. FERNANDES:

Q. Now, this claim, do you see there where it says, "Such ponds provide a source of fresh water when coastal waters are highly saline, above 23 parts per thousand, and may encourage cranes to utilize upland food resources." Do you see that?

A. Yes.

Q. Is that the same claim that we've been talking about that appeared in that Stehn-Taylor article, 2008 article a minute ago?

A. I believe.

Q. And just so we're clear, this claim then that's in the Recovery Plan, at least to your knowledge, that the cranes have to seek fresh water to drink at 23 parts per thousand, is not based upon any peer-reviewed publication, is it?

A. I don't agree. The salinity readings are taken regularly by Mr. Stehn, by Mr. Chavez, many other people that have worked

out there. It's a very simple thing. And they've determined, through field observations, that when the salinity increases between 15 and 23, the birds start moving from the, from drinking salt water to the fresh water ponds inland. And above 23, it's absolutely mandatory. And a scientific experiment with captive birds or whatever, with various salt concentrations, finding out what they'll tolerate has not been done, simply because the field observations were so obvious.

Q. Now, we'll talk about the field observations before, but that wasn't my question. My question related to peer-reviewed publications, and we started by talking about Allen and Hunt. Are you aware -- and we talked, and I think I've got this right, and neither Allen nor Hunt support the proposition that the cranes need to seek fresh water at 23 parts per thousand. Correct?

A. I can't recall what they said.

Q. And so what you're talking about now, just so we're real clear, is not a published peer-reviewed article. You're talking about observations of Mr. Chavez-Ramirez and Mr. Stehn. Correct?

A. And others.

Q. And we'll talk to Mr. Chavez-Ramirez about those.

The fact that this 23 parts per thousand claim appears in the Recovery Plan doesn't make it science, does it?

A. The Recovery Plan is not a scientific paper. It's a

review of literature, and it includes a lot of ideas about things that should be done.

Q. Okay. The fact that the Fish and Wildlife Service states the cranes are forced to seek fresh water to drink when salinities exceed 23,000 (sic) parts per thousand doesn't make it science, does it?

A. If it's based on many observations by competent scientists, I believe it is.

Q. Let's look at Page 68 of your deposition, what you said when I took your deposition. Do you recall when I asked you a question, "Does the fact that the statement appears in the Recovery Plan make it science," wasn't your answer "No"?

A. Yes.

Q. And when I asked you, "Does the fact that the Fish and Wildlife Service makes a statement make it science," wasn't your answer "No"?

A. Yes.

Q. Now, in your expert report, you described International Crane Foundation as a science-based organization. And doesn't International Crane Foundation employ professionals to pursue scientific research projects?

A. Yes.

Q. And isn't your definition of science research projects a clear question and a method for testing whether that fact is true or false?

A. There are two types of science. There's experimental science, which is very controlled in the laboratory, and there are field observations, which is equally credible science.
Q. And I believe you told me if I came to the International Crane Foundation and I wanted you to design a test to test this hypothesis, do the cranes have to seek fresh water when salinities are at certain levels, I believe you told me that you could have performed such a test.
A. Had we seen the need to do such a test, we could have done it. But through the measurements of salinity in the environment of the whooping crane and the responses of the whooping cranes to various salinities, it was very obvious what was happening, and we didn't feel that additional research was required.
Q. Let's talk about what you believe would be the components of that test to test that hypothesis. First, I think you told me that there would be a planning process to design the test. Correct?
A. Yes.
Q. Then you would have to gather data and attempt to interpret the data. Correct?
A. Yes.
Q. Then you would have to test to determine whether or not alternative explanations were viable?
A. The context in which I answered that question was the

experimental design approach, where you're setting up an experiment. At that time I did not discuss direct field observations, which I consider equally credible, in a complex ecosystem which does not render itself to laboratory type of experiments easily.

Q. Well, wouldn't you want to perform a test to determine why Mr. Stehn reported seeing virtually no cranes at fresh water sources when salinities greatly exceeded 23 parts per thousand?

A. I don't recall him saying that.

Q. Wouldn't you want to perform a test --

THE COURT: Let's see if we can hear from --

MR. FERNANDES: I'm sorry?

THE COURT: Let's see if we can hear from Mr. Stehn. Is someone getting that from the, getting from the clerk an instanter subpoena?

MR. BLACKBURN: We'll work together at lunch, if we may, Your Honor, and --

THE COURT: Okay. Is it time to have lunch?

MR. FERNANDES: It probably would, because --

THE COURT: Is this a good time for you to break?

MR. FERNANDES: Yes, it is. It is.

THE COURT: Y'all want to come back at 1:00 o'clock?

MR. FERNANDES: Yes.

THE COURT: Is that long enough for --

(Court and Clerk conferring off the record.)

THE COURT: 1:00 o'clock all right with you all?

MR. FERNANDES: It is, Your Honor.

MS. SNAPKA: I was going to mention, because of the issue regarding the exhibits, if we could have an additional 15 minutes just to meet with Plaintiff so that we could work that out, so it would work a little more smoothly for the Court.

THE COURT: Sounds good to me.

MR. FERNANDES: May we --

THE COURT: You want to come back at 1:15?

MS. SNAPKA: Yes, Your Honor.

THE COURT: Okay.

MR. BLACKBURN: That would be great, Your Honor. Could I also ask, on a daily basis, how late will we be going? Because we'd like to plan in terms of kind of what's --

THE COURT: I like to go from -- we can start earlier in the morning, if you would like, 8:30.

MR. BLACKBURN: 8:30 would be fine, Your Honor.

THE COURT: And go 8:30 to 5:30.

MR. WILLIS: That's fine with the State, Your Honor.

MR. BLACKBURN: That's fine with us.

MR. FERNANDES: Fine with us.

THE COURT: Okay.

MR. BLACKBURN: Sounds good. Just a second.

(Counsel conferring off the record.)

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Thank you. You can step down. Thank you.

THE WITNESS: Thank you.

(Recess from 12:01 p.m. to 1:13 p.m.)

THE COURT: Okay. We were just talking off the record about Mr. Stehn. I told you all to get a subpoena duces -- an instanter subpoena, and then the question is, apparently there are internal regulations that require a certain way to go through this, and y'all didn't go through the hoops, or they didn't allow it after you went through the hoops, whatever. I found a District Court case in D.C. that says that those internal regulations do not trump a Court subpoena. So we'll see if he comes with a U.S. Attorney or if he's even in town. So you're going to try to perfect that subpoena.

In the meantime, we have the disputed Plaintiff's exhibits that are Mr. Stehn's reports that his experts rely upon as government records.

MR. FERNANDES: The case law says, in terms of Government records, it comes in over the hearsay rule. Our objection, though, was with respect to the reliability of the data. That's why we had tried to get around these issues by agreeing with them to conditionally allow all the documents in, and then when the, there was a set of about 15 to 20, and then at the point in time when we've crossed those witnesses, we

could reurge our objection without waiving any objections. That way all of that would come in, and then the Court could rule one way or the other when we reurge our objection at a later point in trial. That's how we were trying to resolve that issue so we wouldn't have this fight about these 20 documents, some of which both of us want to use, but we only want to use to the extent that that motion is not granted. That's why we started permitting them to come in before the trial.

THE COURT: Since you're stuck with admitting them, why don't we just admit them, and then you can attack -- well, it's difficult to attack the reliability of your own exhibits.

MR. FERNANDES: That's why --

THE COURT: Why not just admit them, and then allow you to attack the credibility and the reliability.

MR. FERNANDES: That would be our preference.

THE COURT: I don't know if that's a conditional admission or not. I don't think so.

MR. BLACKBURN: I certainly won't object to Mr. Fernandes or the other Defendants attacking the document or reliability, however they wish to --

THE COURT: That they, that they offered, okay.

MR. BLACKBURN: That they offer. I won't make that objection.

THE COURT: So why don't we try to get those --

MR. BLACKBURN: Well, then if you'll give us a minute, we'll see if we can come to a quick agreement on those numbers, and we'll expedite this.

THE COURT: Time's running.

MR. BLACKBURN: I understand.

THE COURT: Can you designate somebody in your teams to do that? And are y'all just --

MR. BLACKBURN: They're right here.

(Counsel conferring off the record.)

MS. SNAPKA: Your Honor, I'm going to try to keep up with the service of the subpoena. His home was called, but there was no answer. So we'll keep trying.

THE COURT: He's probably out looking at the whooping cranes.

MS. SNAPKA: Probably so.

MR. BLACKBURN: And we have also been told he doesn't routinely carry a cell phone, so, you know, so it may be this evening.

THE COURT: That's fine. At least, you know, see what you can to get it done, and --

MR. BLACKBURN: I think we'll be --

THE COURT: I think it would aid the Court --

MR. BLACKBURN: I think we'll be able to locate him, Your Honor.

THE COURT: Okay.

MR. BLACKBURN: We do know -- I have heard that he's in town.

THE COURT: Okay.

(Counsel conferring off the record.)

MR. WAITES: Your Honor, in order to proceed efficiently today, parties have agreed just to concern ourselves with admission of the things that will be used today. And then, because there are some things that were on the list that we don't want, neither side wants to admit accidentally that we're withdrawing, but we can confer and --

THE COURT: That's fine. In the meantime, I've admitted apparently in this category Defendants' Exhibit, Joint Exhibit 75, 123, 102, 126, and 155, and 319, for purposes of this trial, but still subject to attack by the person who offered them. How's that?

MR. TAYLOR: Sounds good, Your Honor.

MR. WAITES: That's fine with us, Your Honor.

THE COURT: And you've got some more coming up, you think?

MR. TAYLOR: Yes, Your Honor. To streamline things, we would offer at this point Defendants' Exhibit 6, Defendants' Exhibit 38, Defendants' Exhibit 77, Defendants' Exhibit 121.

THE COURT: I got -- oh, I'm sorry, 121 --

MR. TAYLOR: Defendants' Exhibit 124, Defendants' Exhibit 173, and then two Plaintiff's exhibits, Plaintiff's

Exhibit 13 --

THE COURT: Hold up.

MR. TAYLOR: Sure.

THE COURT: Okay. 13?

MR. TAYLOR: And Plaintiff's Exhibit 20. And I think we have an agreement on everything except for we were waiting to hear back on Defendants' Exhibit 77.

MR. WAITES: No objection.

MR. TAYLOR: Okay.

THE COURT: Okay. Then Defendants' Joint Exhibits 6, 38, 77, 121, 124 and 173 are admitted without shackling you to -- without prohibiting you from attacking the reliability of these documents. Not the authenticity, but the reliability.

MR. TAYLOR: And then --

THE COURT: Plaintiff's Exhibit 13 and 20, admitted this, for the same reasons --

MR. TAYLOR: Perfect.

THE COURT: -- under the same conditions.

MR. TAYLOR: Perfect. Thank you, Your Honor.

MR. BLACKBURN: We have a couple more, Your Honor. Sorry.

THE COURT: Go ahead.

(Counsel conferring off the record.)

MR. WAITES: Your Honor, at this time -- these two are already in. Plaintiffs offer 74 through 76, Plaintiff's

Exhibits 74 through 76, Plaintiff's Exhibit 265.

THE COURT: Any objection from the Defendants?

MR. FERNANDES: No objection, Your Honor.

THE COURT: Those exhibits are admitted, still allowing either side to attack their reliability, not their authenticity.

Now, are we ready to put Dr. Archibald back on the stand?

MR. BLACKBURN: Then there he is. I was thinking he might have been missing.

THE COURT: No, he was going to try to come up to the stand earlier, and I told him just to relax.

MR. BLACKBURN: Did you relax?

THE WITNESS: Yeah.

UNIDENTIFIED SPEAKER: Stop relaxing.

MR. FERNANDES: You can always relax when I'm asking questions.

THE COURT: I wouldn't try it.

MR. FERNANDES: May we proceed, Your Honor?

THE COURT: Yes, sir.

CROSS-EXAMINATION (Continued)

BY MR. FERNANDES:

Q. I just want to cover two points before we move on, where we're talking about this 23 parts per thousand, cranes forced to fly to fresh water. And we were talking about if you were

to design a test, what some of the components of that test might be. Wouldn't you need to perform a dawn to dusk observation to see if the cranes get fresh water, and then return to the salt marsh?

A. If you were just studying that aspect of the biology, you would have more comprehensive data.

Q. And wouldn't you also want to put a video camera at the fresh water ponds and record data over 10 to 20-second intervals?

A. Video cameras get a great deal of information.

Q. And wouldn't you want to obtain data across at least one full winter at Aransas?

THE COURT: Do you know how much that costs?

MR. FERNANDES: It's been done in connection with some of the feed studies that we're going to get into a little bit later.

THE COURT: Some of the what?

MR. FERNANDES: Some of the other studies that we're going to be talking about later on during the trial.

THE WITNESS: The more information you can collect, the better it is.

BY MR. FERNANDES:

Q. Let's move on. Haven't you written a paper on the use of supplemental feeders?

A. I wrote a paper in the 1970s on supplemental feeding of

cranes in other countries.
Q. And weren't supplemental feeders placed on the Aransas Refuge in 1969 to determine if the cranes could be attracted to feeding stations?
A. As far as I know.
Q. And wasn't the 1969 experimental supplemental feeding program discontinued for fear of transmission of disease to the entire population?
A. I'm not certain why it was discontinued.
MR. FERNANDES: Your Honor, this was not on our witness list, but this is a document we'd like to put in front of the witness to impeach him. This is an article he wrote on that very topic, where he said that the supplemental feeder program was discontinued for fear of transmission of disease.
THE COURT: Why don't you show it to him first.
MR. FERNANDES: Sure.
THE COURT: Is that all right?
THE WITNESS: I'm sorry, I had forgotten.
(Counsel conferring off the record.)
MR. FERNANDES: Is it okay to put it on the screen?
THE COURT: Why don't you show it to him first, to make sure it's his.
MR. FERNANDES: We'll move along, come back to that.
BY MR. FERNANDES:
Q. In any event, weren't pictures taken of those, from those

supplemental feeders that were placed on the refuge in the winter of 2008-2009?

THE COURT: Say that again.

MR. FERNANDES: Sure.

BY MR. FERNANDES:

Q. Weren't video cameras taking pictures of the cranes that were using the supplemental feeders during the winter of 2008-2009?

A. I don't know.

THE COURT: So there were supplemental -- I thought you said it was discontinued in 1979.

MR. FERNANDES: The supplemental feeders were discontinued in 1969 for fear of transmission of disease.

THE COURT: '69 or '79?

MR. FERNANDES: 1969.

THE COURT: Okay.

MR. FERNANDES: And then for the first time since 1969 they were used during the winter of 2008-2009. And then the following year --

THE COURT: How do you know that?

MR. FERNANDES: Because we have 745 pictures from those feeders, and we have testimony --

THE COURT: A picture is worth what?

MR. FERNANDES: Well, we have the fish documents that say this hasn't been used for forty years. And then also what

happened is the following year they did an environmental assessment. They were not permitted to use supplemental feeders because the Albuquerque office was concerned about disease and predation caused by those feeders. And so what I was going to go into real quickly now is what's already been admitted, pictures from those feeders, DX 194.

BY MR. FERNANDES:

Q. Before you rendered your, arrived at your opinions in this case, did you review this photo of one of those feeders?

A. No, I never saw that picture before.

Q. Did you --

THE COURT: Where did this come from?

MR. FERNANDES: These all come, these are all -- Fish and Wildlife, they had a camera at those feeders, so they could track the cranes that were going to those feeders. We have, I think, 700, I think it's 14 photos.

THE COURT: Was that a -- is that a wild hog or --

MR. FERNANDES: Those are all feral hogs.

THE COURT: Oh, dear.

MR. FERNANDES: Okay.

BY MR. FERNANDES:

Q. Don't those appear to be feral hogs at that feeder?

A. Yeah.

Q. Let's look at 194 and see what else was showing up at that feeder that winter. Don't those appear to all be sandhill

cranes, with a few whooping cranes out in the outskirts?
A. Yes.
Q. Let's look at Exhibit 194. Doesn't that appear to be a white-tailed deer that's --
A. Yeah.
Q. -- at those feeders? And let's look at the last one, and you've got to look really good. One of the lawyers on our team's daughter had to find this one. That's a raccoon over there showing up at the feeders as well. Right?
THE COURT: Oh, they show up everywhere there's food.
BY MR. FERNANDES:
Q. Isn't it possible, sir, that Mr. Stehn's use of supplemental feeders during the winter of '08-'09 may have exposed the cranes to an increased risk of disease and predation?
A. Very slight, if any.
Q. Okay. And first of all, let's talk about predation. Don't you agree that when the cranes go to the uplands, it increases the risk of predation?
THE COURT: If, when the cranes go to the uplands?
MR. FERNANDES: Yeah, uplands.
THE COURT: Like if they're going for fresh water at a high salinity time?
MR. FERNANDES: Well, what they do is they have the salt marsh and then the uplands, and the uplands they go to

because Fish and Wildlife does prescribed burns, to attract them, because it creates feeding events for them. They also go to the uplands to eat, water out of those fresh water ponds, and so they're observed in the uplands all the time. And so the question is whether or not those supplemental feeders may have induced the cranes to go to the uplands during the winter of '08-'09. And then --

THE WITNESS: Okay. My opinion on this is, depends on where the supplemental feeder is placed. As you'll see, it's placed in a very open area. Whooping cranes typically do not like to go near trees, bushes. They like to be in the wide open area like this. So it depends on where the supplemental feeder was placed. And to me, that looks like a very safe site.

BY MR. FERNANDES:

Q. Did you know that supplemental feeder was, they were placed right next to the fresh water ponds?

A. Yes.

Q. So then to the extent that the cranes are going to the uplands, do you believe then that they're in a very safe place and not subject to predation?

A. I think cranes are always subject to predation, even when they're out on the big marshes. There are alligators. If they go near the edges of the marshes, there could be bobcats. It's a natural part of their biology to sometimes go to upland

areas, particularly after a burn, which makes the area even more open, and it's easier for them to see predators.

Q. Is it also your opinion then, to the extent that the cranes go to the unburned uplands, that the increase -- that that increases the risk of predation?

A. Depends if the vegetation is knocked down, as it is in this picture.

Q. Now, aren't you the longest serving member of the Recovery Team?

THE COURT: What?

MR. FERNANDES: The longest serving member --

THE COURT: Oh.

MR. FERNANDES: -- of the Recovery Team.

THE WITNESS: Yes.

BY MR. FERNANDES:

Q. And so let's talk about what was done in the old days to determine crane population and document mortalities. I'm not suggesting you're old when I say "the old days." Okay? Let's talk about —

THE COURT: You're getting very dangerous here.

BY MR. FERNANDES:

Q. How were aerial surveys conducted -- let's talk about how aerial surveys were conducted between 1977 and 1988. Are you with me?

A. Uh-huh.

Q. All right. Let's pull it up. First, between 1977 and 1988, weren't color bands placed on all of the juvenile whooping cranes in Canada?

A. Yes.

Q. Okay. And as of 1988, didn't approximately 59 percent --

THE COURT: What's the exhibit number there?

MR. FERNANDES: This is just a demonstrative aid that we -- both sides agreed that each side could use demonstrative aids.

THE COURT: Any, any aid like that needs to be an exhibit --

MR. FERNANDES: Okay.

THE COURT: -- if you're showing it.

MR. FERNANDES: Okay.

THE COURT: So it's okay with me if you want to mark it, and if there's no objection, I'll admit it.

MR. BLACKBURN: I'll be happy, Your Honor, for him to mark it and admit it.

MR. FERNANDES: Thank you, Counsel.

THE COURT: Go ahead. Why don't you -- do you have somebody on your team to do that?

MR. FERNANDES: Why don't we just do the next one and get that admitted.

THE COURT: Can you print that out? Do you need to print it out? Is that the problem?

MR. FERNANDES: No, that won't be a problem.

(Counsel conferring off the record.)

MR. BLACKBURN: Could we see, could we have printouts of what you --

MR. FERNANDES: Yeah. Counsel, the only reason we didn't provide them before was because of the agreement, so we'll give you copies of everything.

MR. BLACKBURN: I understand. We just haven't seen them and --

MR. FERNANDES: Yeah, we're going to give you all of them.

MR. BLACKBURN: -- kind of making decisions here on the fly.

MR. FERNANDES: Well, I --

THE COURT: Okay. Just remember that for the future. If I'm going to see anything by way of an exhibit, demonstrative or otherwise, I need it to be offered.

MR. FERNANDES: Okay.

(Counsel conferring off the record.)

MR. FERNANDES: All right. What exhibit number are we up to?

THE COURT: Do you need it to be printed out? Can you print that out?

MR. TAYLOR: Is there a printer that we could connect to here?

THE COURT: Can you hook that up to a printer? Let's get -- let's get some Systems people up here and see if we can shortcut that.

(Counsel conferring off the record.)

THE COURT: Mr. Fernandes, I just need to look at those after the thing. You see what I mean?

MR. FERNANDES: I appreciate it. And I apologize.

THE COURT: It's such a beautiful exhibit.

MR. FERNANDES: We should have -- when we initially had the pretrial Thursday, we were going to try to raise a lot of these issues, and then, so it kind of snowballed when we're here in trial on the same day today.

THE COURT: I see what you mean.

MR. FERNANDES: Yeah.

THE COURT: We should have done a pretrial.

MR. FERNANDES: And so we were going to try to clean up these issues of the --

THE COURT: That's my fault.

MR. FERNANDES: And then say, subject to the Court's approval.

THE COURT: I'll give you each an extra five minutes because of it.

MR. FERNANDES: I wish Mr. Blackburn was up here right now.

MR. BLACKBURN: Mr. Blackburn's glad he's not.

THE COURT: Can you put that back up?

MR. BLACKBURN: Your Honor, may I -- I hate to complicate this, but we haven't seen any of these, and --

THE COURT: Okay. You need to show them. Whatever --

(Counsel conferring off the record.)

MR. FERNANDES: I think we can resolve this. I forgot, we have boards of these. I think we can show them to Counsel through the board.

THE COURT: Do you have -- let's see. Do you have any memory sticks with you?

UNIDENTIFIED SPEAKER: Yes. Yes, we do.

THE COURT: Why don't you print all those off on a memory stick, and we'll get, I mean, put them on a memory stick and then I'll put them on a printer. She's got it. I set an extra table up for y'all, too.

UNIDENTIFIED SPEAKER: Thank you, Your Honor.

THE COURT: If you want to put people on it.

(Counsel conferring off the record.)

MR. BLACKBURN: Your Honor, we have never seen this set of exhibits. I was trying to be somewhat --

THE COURT: I don't think a telephone call is going to do it.

MR. FERNANDES: Because we hadn't intended to make it an exhibit.

THE COURT: Okay.

MR. FERNANDES: We had reached an agreement that we both could use demonstrative aids, and we were going to try to use demonstrative aids to speed up the trial.

MR. BLACKBURN: But now we're talking about admitting it into evidence, and that's a whole different thing.

MR. FERNANDES: I understand.

MR. BLACKBURN: So -- I think we're going to -- are we back on the record?

THE COURT: We're on the record.

MR. BLACKBURN: I think we would at least right now object to this set of aerial -- these, the exhibits that we've never seen before that are being marked and circulated, at least looking at one. I can represent that there's information here that I don't know if it's accurate or not accurate.

THE COURT: It's granted.

MR. BLACKBURN: Thank you.

THE COURT: I'll give you leave, but I hesitate to say we can take it up tomorrow after you've looked at them or looked at, you know, compare them with your experts, but they're not going to be applicable to Dr. Archibald, because he's going to be gone as of today.

MR. BLACKBURN: And I, you know, again, Your Honor, we'll try to work with Counsel to do these, but if they're exhibits, I'm concerned.

THE COURT: What you can do is talk about hypotheticals. I don't need to tell you how to try your case, but --

MR. FERNANDES: Well, every single fact in there we can just prove up. That's why we were going to use it as a summary document and that's how we could proceed. Every fact in that document we could prove up through the prior testimony.

BY MR. FERNANDES:

Q. So let's start again and make sure, I may have asked this question already. As of 1988, didn't approximately 59 percent of the whooping cranes have color bands?

A. Yes.

Q. And second, on or before 1986, weren't radio tracking devices placed on eight of the cranes?

A. Yes.

Q. And third, weren't low passes being made during aerial surveys to try the read those color bands?

A. Yes.

Q. And fourth, weren't locations of color marked whooping cranes recorded on maps?

A. Yes.

Q. And fifth, weren't color bands also being observed on the ground by using boats and vehicles?

A. Yes.

Q. And finally, weren't weekly surveys being used to read

those color bands?
A. Do you mean from aircraft?
Q. Yes.
A. Yes.
Q. And weren't color bands being used during that period of time to detect probable mortality at Aransas?
A. Yes.
Q. And don't you agree that color bands helped assess mortality on the wintering grounds at Aransas?
A. Yes.
Q. And weren't radio devices also being used to detect probable mortality at Aransas?
A. Yes.
THE COURT: And we're talking '77 through '88?
MR. FERNANDES: Yes, Your Honor.
BY MR. FERNANDES:
Q. Now, let's talk about, you talked a little bit on your direct examination of what was, what was learned from putting these color bands on the cranes and what was learned from putting these radio tracking devices on the cranes. Wasn't one of the things -- take a step back. One of your opinions in this case, is it not, is that site tenacity is so profound that the whooping cranes will not abandon their territory, even with acute food shortages?
A. I know that the tenacity of the cranes to their territory

deteriorates if the food source disappears from their territory.
Q. But through those color bands, didn't you learn that although the family groups usually remain in their territory, they occasionally make unsuspected movements to other areas?
A. Especially to fresh water drinking areas.
Q. And didn't you learn through those color bands that sometimes the cranes left their territories for days, weeks, and sometimes months at a time?
A. You'll have to check with Mr. Stehn.
Q. Well, did you look at that before you arrived at your opinion in this case that those aerial surveys were reliable?
A. I believe that all of his aerial surveys were reliable over these many years.
Q. Wasn't another thing that was learned from those color bands that as the spring approaches, the whooping cranes increased their forays outside of their territories?
THE COURT: As the what?
MR. FERNANDES: As the spring approaches --
THE COURT: Thank you.
BY MR. FERNANDES:
Q. -- the cranes increase their forays outside of their territories.
A. I'm not sure of that.
Q. And don't we know that during the winter of 2008-2009, the

cranes were induced to leave their territories by the Fish and Wildlife Service prescribed burns in the uplands?

A. We know that cranes are attracted to burn areas, and I don't think they intentionally meant to attract the cranes from their territories, and there are various reasons for burning, quite aside from cranes, to maintain the natural grassland, oak savanna ecosystems.

Q. Don't the cranes use the uplands every year, as part of their normal behavior?

A. You'll have to ask Mr. Stehn. I'm not sure.

Q. Didn't Mr. Stehn specifically tell you, during the winter of 2008-2009, that crane families were leaving their territories for periods of time and then returning to their territories?

A. I believe he said that.

Q. Let's talk about another one of your opinions. Isn't it one of your opinions that the lone juveniles are likely to face almost certain death if they are separated from their parents?

A. It's highly probable.

Q. But as a result of those color bands, didn't we learn that juveniles that were separated over 200 miles from their parents survived the entire winter?

A. Occasionally in biological systems, you'll have everything happen. It's what happens most of the time that's significant. We call this a normal distribution. We have had cases where a

juvenile will become lost during migration, join sandhill cranes, move into agricultural fields where they're feeding and survive. It's an unusual event, but it has happened. The usual event is for the chicks to remain with their parents on their territories.

Q. Now, have you read Mr. Stehn's aerial survey reports to arrive at your opinions in this case?

A. Partly.

Q. And don't those reports, don't those winter reports report from time to time juveniles leaving their parents, joining the subadults for days and months at a time, and then returning to the parents?

A. I don't recall that.

Q. In prior years, from those reports you've read, hasn't Mr. Stehn reported juveniles going to the uplands alone for hours at a time, and then rejoining their parents in the territories?

THE COURT: Would you restate that again, please?

MR. FERNANDES: Sure.

BY MR. FERNANDES:

Q. In prior years, hasn't Mr. Stehn reported juveniles going to the uplands alone, for hours at a time, and then rejoining their parents in their territories?

A. I know that he has reported juveniles leaving their parents, and if he observes the parents twice on two different

occasions separated by a period of time and the juvenile has not returned, he considers that bird dead.

Q. Let's look at --

A. But --

Q. I'm sorry. I apologize.

A. -- I can't recall if he mentioned juveniles on their own going into the uplands.

Q. And I apologize.

MR. FERNANDES: Is 171 in? 169?

BY MR. FERNANDES:

Q. Let's talk about the winter of '08-'09, how aerial surveys were conducted that year, the winter in question. Didn't Mr. Stehn estimate the flock size at 270 cranes during the winter of 2008-2009?

THE COURT: How much?

MR. FERNANDES: 270 cranes.

THE WITNESS: At the beginning of the winter, yes.

BY MR. FERNANDES:

Q. And at most, didn't approximately only 6 percent of the cranes have color bands by the time we got to the winter of 2008-2009?

A. I'm not sure what percentage had them.

Q. Let's look at Exhibit 6, Page 33. First, let's go to Page 6, the front page. You have reviewed, have you not, Mr. Stehn's Whooping Crane Recovery Plan for October 2009?

A. Yes.
Q. And you did review that in connection with arriving at your opinions in this case, did you not?
A. Yes.
Q. Now, let's go to Page 33, please. Do you see there where it says, "At most 16 cranes were a color motte (phonetic) representing 6.5 percent of the population in the spring of 2009 --
A. Yes.
Q. Do you have any reason to doubt that figure?
A. No.
Q. And isn't it true that during the winter of 2008-2009, none of the cranes had radio devices?
A. As far as I know.
Q. And weren't low passes to read those color bands largely abandoned, because there were so few bands on those cranes?
A. The reason for flying low during the intensive banding period was to answer questions about the biology of whooping cranes, which were formerly unknown. That was the reason for the color banding. What age do they breed, do they stick with the same mate, do they maintain the same territory, how long do they live. So during that study, very intensive observations were made of the marked birds, and research papers were written answering those questions.
As the banding stopped and as fewer banded birds appeared

each winter, the intensity of that research tapered off as well, and there was not the emphasis placed on identification of the birds, as there had been during the intensive banding period.

Q. Let me try it again. During the winter of 2008-2009, weren't low passes to read those color bands largely abandoned because there were so few color bands on the cranes?

A. Probably.

MR. FERNANDES: 123 is in? Is 123 in?

THE COURT: No. Do you want to offer it?

MR. FERNANDES: I'll go on.

BY MR. FERNANDES:

Q. Weren't attempts to read those bands from the ground by using spotting scopes largely abandoned during the winter of 2008-2009 because there were so few bands, color bands on those cranes?

A. You'll have to ask Mr. Stehn.

Q. And during the winter --

THE COURT: Spotting scopes? Say that again.

MR. FERNANDES: I'm sorry. I said, "Weren't there attempts to read those color bands from those ground observations" --

THE COURT: Okay.

MR. FERNANDES: -- "on the boats and in the vehicles largely abandoned during the winter of '08-'09, because there

were so few bands on the cranes?"

THE COURT: Okay.

BY MR. FERNANDES:

Q. And during the winter of 2008-2009, instead of weekly flights, like we had from '77 to 1988, wasn't Mr. Stehn doing aerial surveys every two weeks?

A. Yes.

Q. And by his own admission, did Mr. Stehn admit that out of the twelve aerial surveys that he did during the winter of 2008-2009, he only considered six of them to be reliable?

A. I believe he had problems with the weather, and I don't know what the other factors were, but some of them he, he wasn't sure of the counts, and he was perfectly open to admitting that, that he had environmental problems doing the counts.

Q. Well, that's --

A. But he had a number of what he considered to be accurate counts.

Q. Let's go back and look at the, Mr. Stehn's report, Defendants' Exhibit 6 that we talked about before, the '08-'09 report, specifically Page 22. He lists, Mr. Stehn lists, does he not -- well, if you look at the top paragraph, "Data are omitted from flights when only a partial census was made or when cranes were still arriving or departing into migration." And doesn't he then list the six aerial surveys from the winter

of '08-'09 that he considered to be reliable?
A. Yes.
Q. So during the winter of 2008-2009, wasn't Mr. Stehn trying to determine mortality largely without the use of color bands, radio transmitters and ground observations of those color bands?
A. Mr. Stehn made every effort to find dead birds through his aerial surveys, ground surveys. And because very few birds were banded, he did not have a specific mission to find banded birds. And none of the birds were radio marked because that study had been discontinued.
Q. But my question was, is during the winter of 2008-2009, wasn't Mr. Stehn attempting to determine crane mortality by conducting aerial surveys -- I'm sorry -- without the use of color bands, largely without the use of color bands, there were no radio transmitters, and largely without the use of ground observations of those color bands?
THE COURT: I think he said yes.
THE WITNESS: Yes.
MR. FERNANDES: I'm not sure --
THE COURT: That's my understanding.
THE WITNESS: Yeah.
MR. FERNANDES: Okay. I missed it. I'm sorry.
THE COURT: Because there was almost no banding, very few bands, birds were banded --

MR. FERNANDES: Yeah.

THE COURT: -- so there's no use observing for them if they're not there.

BY MR. FERNANDES:

Q. And during the winter of -- let's talk about Mr. Stehn's methodology for presuming mortality during the winter of 2008-2009. Are you with me?

A. Gotcha.

Q. When Mr. Stehn flew over crane territory and saw an adult pair but no juvenile, didn't he assume the juvenile crane was dead?

A. If he did that survey again at a later time and the juvenile was still missing and he couldn't find a juvenile missing somewhere, he assumed that that bird was dead.

Q. For example, let's go back to his report on Page 25, DX Exhibit 6. If you look, for example, at the top, this is a table in Mr. Stehn's '08-'09 report, and it says, does it not, "Chronology of whooping crane mortality during 2008-2009 winter." Do you see that?

A. Yes.

Q. And then if you go down to that February 11th, do you see he's describing his -- he says, "A solitary juvenile, from an unknown family, on south end of San Jose Island, was last sighted on January 29th census at a dugout." Do you see that?

A. Yes.

Q. And so the, that juvenile had been sighted on January 29th, and because it wasn't sighted on February 11th, wasn't that juvenile presumed to be dead?
A. I don't know what juvenile that was or what the circumstances were of -- if the birds were not marked, there would be no way of telling what juvenile that was.
Q. In your expert report, don't you specifically say that many lone chicks were found without their parents during the winter of 2008-2009?
A. Yes.
Q. And it's not a viable methodology, is it, to assume that every time you see a lone juvenile that the juvenile died?
A. Um --
Q. I'm sorry, let me rephrase, please. It's not -- I'm sorry. Withdraw the question.
MR. BLACKBURN: I think that mischaracterizes his testimony.
MR. FERNANDES: I'll withdraw the question.
BY MR. FERNANDES:
Q. It's not a viable methodology, is it, to assume that every time you see a lone juvenile that the adult crane has died?
A. No.
Q. Let's talk about the changes that were made following the winter of 2008-2009. Following the winter of 2008-2009, wasn't a decision made to attempt to place 60 radio transmitters on

the cranes over three years at both Aransas and Wood Buffalo?
A. Yes.
Q. And haven't approximately 22 telemetry devices been placed on the cranes since the winter of 2008-2009?
A. Yes.
Q. And that during the past two winters, haven't those radio devices been used to help detect mortality at Aransas?
A. Yes.
MR. FERNANDES: Is 126 in?
UNIDENTIFIED SPEAKER: Yes.
BY MR. FERNANDES:
Q. Let's --
MR. FERNANDES: Is 38 in?
THE COURT: Yes.
UNIDENTIFIED SPEAKER: Yes.
BY MR. FERNANDES:
Q. Okay. Let's look at Exhibit 38, please. This is the whooping crane recovery activities report for '08-'09. Did you review this document in connection with arriving at your opinions in this case?
A. Yes.
Q. Let's turn to Page 17. And on Page 17, it says, does it not, "Plans call for capturing, doing health screening, and placing bands, GPS, PTTS and conventional VH transmitters on 60 birds over three years at both Aransas and Wood Buffalo."

Correct?
A. Yes.
Q. And so today, isn't -- aren't attempts being made to conduct health screening on those cranes?
A. Yes. Whenever cranes are captured, blood samples, cloacal swabs and throat swabs are taken to do a variety of tests to see what diseases are out there.
Q. During the winter of 2008-2009, were there any health studies done to determine the health of the cranes?
A. Just observations.
Q. During the winter of 2008-2009, to your knowledge, did anybody call up the National Wildlife Health Center and ask a member of the response team to go to Aransas to check on the condition of the cranes?
A. I don't know the answer to that, but I'm sure that the birds that were found dead were sent there for necropsy.
Q. To your knowledge, were any blood samples taken during the winter of 2008-2009?
A. Birds weren't captured.
Q. Now, you've been a member, as we say, of the Recovery Team for a number of years. Isn't the standard approach for determining mortality placing bands on cranes, which are followed through time to determine their fates?
A. That's one way.
Q. Let's talk a little bit about the events following the

winter of '08-'09. Didn't Mr. Stehn report that there were 247 whooping cranes as of April of '09, after that winter?
A. Yes.
Q. And in your expert report, and I think in your testimony a minute ago, you said that in a typical year, there's an 8 percent mortality rate from April to November of any given year.
A. Yes.
Q. So in a typical year, wouldn't you expect -- 247 are there by April, in a typical year, wouldn't you expect 20 cranes to have died following the winter of 2008-2009?
A. It was probable.
Q. This wasn't your typical year, based upon the average mortality --
A. Right.
Q. -- over a number of years?
A. And some had high mortalities and some had almost zero mortalities. So there's variation. That's an average number.
Q. And if we are to believe Mr. Stehn's numbers, didn't only five cranes die between April 2009 and November of 2009?
A. Yes.
Q. And isn't that the lowest mortality in the past 21 years?
A. I can't recall what the mortality for each of those years was.
Q. And so let's just take a step back. The winter of

2007-2008, I think you gave as a good year, right, on the -- there was no crane mortalities while wintering at Aransas. Correct? '07-'08.

A. I believe not, but --

Q. And then if we're to believe Mr. Stehn's numbers, following this good year, when no cranes die at Aransas, 34 cranes died between the time they left in April and the time they arrived the following year. Correct?

A. Yes.

Q. And then if we are to believe Mr. Stehn's numbers, following the worst year ever at Aransas, when there's 23 mortalities, they migrate back to Canada, and we have the lowest mortality rate in 21 years. Correct?

A. I'll have to check the numbers of the mortality in other years. I can't remember what they were.

Q. Doesn't that cause you at least to pause and say maybe something's wrong going on here?

A. Well, we were delighted that the mortality was low, because we were expecting a much greater hit.

Q. And then in October of 2009, didn't Mr. Stehn predict that there would be 247 cranes at Aransas that winter?

A. Would you repeat that?

Q. Sure. In October of 2009, when Mr. Stehn did his annual report, did he or did he not predict or anticipate that 247 cranes would arrive at Aransas for the winter of 2009-2010?

A. Yes, I believe that's correct.
Q. And didn't 17 additional cranes arrive that were not expected? And every single one of them were white plumaged adults?
A. Yes.
Q. So let's think back about this missing equals dead. Seventeen juveniles, if we are to believe these numbers, die in Aransas during the winter of '08-'09. Correct?
A. Sixteen.
Q. Now, given the life cycle of cranes, those juveniles the following year would be white plumaged adults, would they not?
A. Yes.
Q. And so the next year, lo and behold, 17 white plumaged adults show up that aren't expected. Correct?
A. There was low mortality from the time they left until they returned. That's our belief.
Q. Isn't it true that all 16 juveniles that were missing and presumed dead during the winter of '08-'09 didn't have color bands?
A. They didn't.
Q. So we can't tell, can we, whether the 17 white plumaged adults that returned during the winter of '09-'10 included some or all of the 17 juveniles that were presumed to be dead during the winter of '08-'09.
A. The birds weren't banded.

Q. Now, do you understand that TAP has been identified -- TAP has identified the International Crane Foundation as one of its members?
A. Yes.
Q. Oh, before we do this, let me ask you one other thing. We were discussing this morning about what is the mortality rate while at Aransas, and you said 8 percent. And then I think in response to one of the Judge's questions --
A. It's --
Q. -- about what is the -- I'm sorry.
A. It's 8 percent from the time they leave until they return.
Q. I stand to be corrected. And then what I want to focus in on is what is the mortality rate at Aransas typically versus the mortality rate while they're migrating. Are you with me?
A. Yes.
Q. Let's go back and look at the March 2007 Recovery Plan, please. Specifically, Page 4, please. Could you pull up that bottom paragraph? Now, this is what you usually see on average. Right? And that is mortality during April through November was five times greater than mortality on the wintering grounds. Correct?
A. Yes.
Q. So if I'm following this, if I look at mortality while they're migrating, if I divide by five, that should tell me, on an average year, what sort of mortality I'm going to have at

Aransas. Right?
A. Yeah.
Q. Now, if you believe Mr. Stehn's numbers in this case, 34 whooping cranes died before they even got to Aransas that year. Correct?
A. If you calculate from that number. But I want to stress to you that there's tremendous variation in these survival rates per year. Some years will have less, some years will have very few.
Q. What I'm trying to get at is, there's a great year at Aransas, no cranes die, and between that April and that November, 34 died before we even get to the winter of '08-'09. Correct?
A. Yes.
Q. Have you done anything to determine what, if any, impact or what, if any, carryover effect the death of 34 cranes, how that may have impacted alleged mortalities at Aransas during the winter of '08-'09?
A. I don't think it would, from my opinion, it wouldn't have any impact. If the birds are dead before they got there, it's not going to affect the birds that made it.
Q. Isn't the 34 mortalities during the migratory period preceding the winter of '08-'09 the largest mortality ever during a migratory period?
A. I'll have to check the figures.

Q. Isn't it also true that the International Crane Foundation has not suffered any economic harm from the alleged deaths of 23 cranes during the winter of '08-'09?

A. I'm sure we have not.

MR. FERNANDES: Your Honor, we pass the witness.

THE COURT: Thank you. Any further questions?

MR. BLACKBURN: Excuse me, Your Honor. Are other Defendants going to be offered the chance to cross? Or are you going to limit it to one?

MR. WILLIS: Your Honor, if I might address that, if it was okay with the Court, Mr. Fernandes and I just have a division of labor basically so we could try to move this along as quickly as possible throughout the trial on all the witnesses.

THE COURT: Thank you very much.

MR. WILLIS: Yes, Your Honor.

THE COURT: So you're just incorporating his questions --

MR. WILLIS: Yes, please.

THE COURT: -- as your own? You can do that. And now, is this gentleman released for good?

MR. BLACKBURN: May I ask a couple of questions on redirect?

THE COURT: Oh, absolutely.

MR. BLACKBURN: I just wanted to make sure. I wasn't

quite sure how they were handling that, so I wanted to ask.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. A couple of things, Dr. Archibald. First, this whole question of variability of deaths in different parts of the, of the year and during different parts of the life stage in the year of a crane. Do you expect to see tremendous variability? And if so, why?

A. Yes. If you just look at the data of the number of birds that die in migration, you'll see that some years there are very few, and some years there are many. And the Recovery Team was very concerned about losses of birds during migration, particularly since so many wind farms are going up along the migration route.

That was the reason we initiated this aggressive radio telemetry, satellite radio telemetry study of birds in recent years, because our -- as a Recovery Team, our main concern was that, although the whooping cranes migrate in small groups, are there areas of that huge migration corridor where they come more often? And then we could advise people that want to put up wind farms or local governments that it might be not a good idea to put them in such-and-such place. That was a reason for it, for that study.

And then to answer your question, yeah, there's tremendous variability in this mortality, and we don't understand it. And

doing these studies helps us get a handle on it.
Q. And --
A. Because we could determine, by having satellite radios on the birds, exactly where they died. We can find them. We know we can go and find the carcass.
Q. Now, I'm trying to remember, early on Mr. Fernandes showed you a study from the work that was done by the Recovery Team, or at least a statement by the Recovery Team about the number of carcasses that have been recovered over a period of time where there was about, I think, 178 deaths. And if I recall, was that 9? Was that the number? Do you recall?
A. A very low number. I think it was 9.
Q. And so I was going to ask, I mean, am I clear that that was out of a reported loss of 178 birds, only 9 carcasses were found and were able to be analyzed?
A. Right.
Q. So to find 4 carcasses when 23 are reported to be missing, or presumed to be dead, is that a high recovery incidence for carcass recovery?
A. I think that's rather normal, considering the size of the area and the infrequency of aerial observations. A bird would be taken by a predator and hauled off into the bushes, and you'd never see the carcass.
Q. Now, in your testimony, I think you used a difference, you've contrasted direct versus indirect causes of mortality.

Could you explain what you meant by that?
A. The direct cause of mortality would be a specific disease or incident. The indirect cause would be a weakening of the bird to make them more vulnerable to those incidents.
Q. And I think you also used the term "circumstantial." Do you mean the indirect and circumstantial in the same way, or do you see that as different?
A. I don't understand the use of "circumstantial" that I used.
Q. Well, I may have misunderstood you, so -- but in terms of the cause of death, you believe there is both direct and indirect causes of death?
A. Yes, definitely.
Q. And in the case of malnourishment, do you consider malnourishment to be a direct or an indirect source of mortality?
A. In the majority of cases, it would be the indirect, and then it would make them more susceptible to a predator kill or to some residual disease that they might be carrying.
Q. Now, with regard to banding cranes, is there any risk that's associated with banding of birds?
A. Yes, there is. During the years that the whooping cranes were banded at Wood Buffalo National Park, researchers were dropped by helicopter or placed by helicopter to run down the birds. And I think there was a .05 percent mortality, and we

call this "capture myopathy." Through the stress of that event, the bird just died in the hands of the researchers or shortly thereafter. So whenever you capture wild animals, there is a danger of losing one.

Q. Sir, in terms of the decision to drop the banding, was the decision to drop the banding basically a risk-benefit type of analysis and the information had been collected?

A. Actually, some members of the Whooping Crane Recovery Team, particularly the American members, wanted to continue the banding. But our Canadian colleagues decided that this intensive banding has gone on now for 12 or 14 years, I forget, and a few birds have died. We've answered the questions we wanted to answer, and we're not going to do any more banding, for a period.

Then the wind machine, wind farm threat was lifting its head, and that was one of the major reasons that we wanted to get more data on the movements of the birds and the causes of mortality. Because we just had such a derth of data from the time they leave the breeding grounds until they reach Aransas.

Q. Did the loss of 23 birds surprise the Recovery Team for the period of 2008-2009? And if so, you know, could you explain that?

A. It was a great shock. We knew that there were problems that winter, because Tom was giving us regular reports. So yeah, it was sad news.

Q. And then finally, one of my colleagues has pointed out, you used the term "subadult." And could you explain what a subadult is?

A. When that bird is with its parents, we call it a juvenile. So we call them juveniles, up until the time they migrate in the spring. Actually, they're still called juveniles when they get back to the breeding grounds, and they're sometimes driven off by the adults.

Then they join up with other juveniles. They now have attained their white plumage, but the reproductive hormones have not struck. They go around in small groups and are quite nomadic. We call these subadult birds. And on the wintering grounds, we can see flocks of subadult birds.

If an adult crane loses a mate, it will sometimes join the subadult birds and find a mate and then go back to its territory. We have some evidence of that. But by and large, these are younger birds, age one, two, and possibly a few of the older birds.

MR. BLACKBURN: I pass the witness, Your Honor.

THE COURT: Thank you.

MR. FERNANDES: I have just one thing. Could you give me Defendants' Exhibit 77, Page 6.

RECROSS-EXAMINATION

BY MR. FERNANDES:

Q. I'd like to talk about the population counts. Let's talk

about the population counts for the cranes. And this is one of the Plaintiff's exhibits. Could you pull up the right side so we can really look at these numbers?

MR. BLACKBURN: It's not one of our exhibits for this trial.

MR. FERNANDES: Is it DX?

UNIDENTIFIED SPEAKER: It's 77, Defendants' Exhibit 77. It's already admitted.

MR. FERNANDES: I'm sorry.

MR. BLACKBURN: I'm just --

MR. FERNANDES: I apologize. It's Defendants' Exhibit 77.

BY MR. FERNANDES:

Q. Now, first of all, what's being depicted here are population count numbers. Correct?

A. Yes.

Q. Based upon aerial surveys?

A. Yes.

Q. And if you go back and show from 1940 on, every single number on this chart from 1940 all the way to 2008, what we have here is peak population numbers. Correct? Prior to that last number.

A. They're the numbers that happened that year.

Q. Okay. Now, let's look at, pull up the right side again. So, if I'm following this, what this is is Mr. Stehn makes a

number of flights, and he determines a peak population number for the year. For example, in 2008-2009, the peak population number was 270. Correct?

A. Yes.

Q. And every single figure on this visual, from 1940 until the end, that last number, is a peak population number. Right?

A. Yes.

Q. Except that number 247. Right? That's not a peak population number. Wasn't the actual peak population in the year 2009 264?

A. Yeah, I'm confused about that.

Q. In other words, the peak populations, didn't they go from 270 to 264 to 283, and now we're expecting over 300 this winter?

A. I believe so.

Q. And so to try to -- when you put 247 there, which is an end-of-the-winter number, which is not anywhere else in that visual --

MR. BLACKBURN: Your Honor, I'm going to object at this point. He said, "When you put this there." This is not an exhibit by Dr. Archibald.

MR. FERNANDES: I'll withdraw the question.

THE COURT: Okay.

MR. BLACKBURN: And the graph ends in April '09.

THE COURT: Okay.

BY MR. FERNANDES:

Q. Now, in any event, if you put the actual peak number there, 264, then it shows that the difference between year-to-year crane mortality is not 23. It's 6, isn't it?

A. Yes.

Q. And then the next year, it goes up to 283, and this year we're expecting in excess of 300. Right?

A. Yeah.

MR. FERNANDES: Pass the witness.

THE WITNESS: Um -- am I allowed to make a comment?

THE COURT: Go ahead.

THE WITNESS: Could you put the whole graph up?

MR. FERNANDES: Sure.

THE WITNESS: I just wanted to look at it. I just wanted to make a point. If you look back to 1950, or 19, say, late '40s to mid '50s, that was the period of the great drought in Texas. And there is very, very -- the population stayed at 34 or 33 birds. It was a very, very critical time. And then after that, the water conditions became better and the population started to increase.

MR. FERNANDES: No further questions, Your Honor.

MR. WILLIS: Your Honor, before you release Dr. Archibald, I'm sorry for my paranoia, but I want to clarify what we discussed briefly earlier, because this came up in a motion that the State filed prior to trial, and then there was

a reply filed by TAP regarding a joinder the State filed in one of GBRA's objections.

THE COURT: Oh, I didn't have any problem with -- you, you're joint.

MR. WILLIS: Thank you very much.

THE COURT: Thank you.

MR. WILLIS: And for, just for the record, for any purposes, any evidence that the, that any of the Defendants offer on behalf of all the Defendants as against TAP's case, and the same thing if the Court is okay with this, one objection is good for all the Defendants in this case, so we can move along?

MR. BLACKBURN: Fine with me, Your Honor.

THE COURT: That's fine.

MR. WILLIS: Sorry to bother the Court with that.

THE COURT: No problem. You can't bother me. I can probably bother you, but not the other way around.

MR. WILLIS: As long as I'm seated.

THE COURT: Are we finished with Dr. Archibald?

MR. BLACKBURN: Yes, Your Honor.

THE COURT: He's excused for all purposes?

MR. FERNANDES: Yes, Your Honor.

THE COURT: Thank you very much. I enjoyed meeting you. Have a good trip to North Korea.

MR. BLACKBURN: Would you like me to call my next

witness, Your Honor?

THE COURT: Yes, sir.

MR. BLACKBURN: Dr. Ronald Sass, please.

(Witness sworn.)

MR. BLACKBURN: And Your Honor, I think we failed to offer one additional exhibit of Dr. Sass', Exhibit, Plaintiff's Exhibit 266. I believe it is unopposed, but I would ask.

MR. TAYLOR: No objection.

THE COURT: 266 is admitted, Plaintiff's Exhibit. Go ahead.

RONALD SASS, PLAINTIFF'S WITNESS NO. 2, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. For the Judge, would you state your name, please?

A. Ronald Sass.

Q. Would you spell that?

A. S-A double S.

Q. And where do you reside, Dr. Sass?

A. Houston, Texas.

Q. And what is your current position that you hold?

A. I'm emeritus professor at Rice University and a fellow of the Baker Institute.

Q. What's the Baker Institute?

A. The Baker Institute is the institute of public policy at Rice.

Q. We might just slow down just a little bit.
A. Yes, sir.
Q. Get the adrenaline going. Have you prepared a resumé?
A. Yes, I have.
Q. And --
THE COURT: The Baker Institute, who is that named after, Baker?
THE WITNESS: Pardon?
THE COURT: What Baker is that?
THE WITNESS: It's the --
BY MR. BLACKBURN:
Q. Would that be James Baker?
A. No. It's -- I'm drawing a -- I have a Rick Perry address here.
MR. BLACKBURN: It's going to be a long day, Your Honor, I can tell.
THE WITNESS: James, Jimmy, James Baker. James A. Baker, III.
BY MR. BLACKBURN:
Q. And that would be the former Secretary of State?
A. Thank you.
Q. Is that correct?
A. That's the one.
Q. And I would like to put up Plaintiff's Exhibit 260. Just show you, it's the front page of your resumé, and I want to ask

you some questions from that resumé, if we could. What is your educational background?

A. My undergraduate degree is from Augustana College in Rock Island, Illinois, in chemistry and mathematics. My Ph.D. from the University of Southern California in physical chemistry.

Q. And could you describe briefly the positions that you've held after you graduated with your Ph.D.?

A. I had a post-doctoral experience at Brookhaven National Laboratory doing physics actually on neutron scattering. The next year I went to Rice University and have been there ever since, except for sabbatical leaves with NASA in Langley, Virginia, and with the Cambridge University in England.

Q. And what professional ranks have you held at Rice?

A. Assistant, associate and full professor, and now emeritus professor.

Q. And did you hold any leadership positions in any of the departments within which you worked?

A. I was chairman of the biology and the ecology department for several years, and I was also co-director of the wetlands center in the biology department.

Q. And have you published any peer-reviewed papers?

A. Yes, I have.

Q. Approximate number?

A. Approximately 165.

Q. And do you have any publications on whooping cranes?

A. I have one publication on whooping crane with the Baker Institute.
Q. And do you consider it to be peer-reviewed?
A. Yes, I do.
Q. Now, very quickly, what types of courses have you taught over the years?
A. I've taught a variety of courses in chemistry and biology and ecology, including introductory chemistry, quantum mechanics, x-ray defraction, earth systems -- excuse me -- climate change, environmental science, physical chemistry.
Q. And have you received any awards of any type during your professional career?
A. Yes.
Q. And would you identify those, please?
A. Well, the one I guess I'm most proud of is that I'm a member of the Intergovernmental Panel on Climate Change, and as such a partial recipient of the Nobel Prize in Peace in 2007.
Q. So you've got a piece of the Nobel Peace Prize?
A. A piece of the peace prize, yes.
Q. And are you a member of any halls of fame?
A. Yes, I'm a member of the Texas Science Hall of Fame.
Q. And have you received other awards?
A. Oh, a Guggenheim Fellowship, a National Research Council Fellowship, the Gold Medal from Rice University.
Q. Is that for showing up or --

A. Something like that, yes.

THE COURT: Perfect attendance.

BY MR. BLACKBURN:

Q. Perfect attendance. And have you, do you currently serve on any boards?

A. I'm a member of the Nature Conservancy Board of Texas, and a member of the Galveston Bay Foundation Board and the Shell Sustainability Center.

Q. And what are your areas of expertise, the areas in which you work? I know you're not doing active research any more, but what areas do you consider yourself to have expertise in?

A. Oh, I have done active research in several areas, physiology, for example, wetland studies, methane emissions from rice fields, global planet change, calcification of estuary mollusks.

THE COURT: Were you part of the movement behind calling it, changing it from global warming to climate change?

THE WITNESS: I was never, never into global warming. I always called it climate change.

THE COURT: Okay.

MR. BLACKBURN: And --

THE COURT: What's the difference?

THE WITNESS: It's broader than global warming. Global warming is a misnomer completely. I would call it global catastrophe myself --

THE COURT: Thank you.
THE WITNESS: -- but nobody likes that term.
THE COURT: That's probably true.
THE WITNESS: I think it's very true, yes.
THE COURT: So how much time do we have left?
THE WITNESS: We don't want to go there.
THE COURT: Should we just adjourn?
BY MR. BLACKBURN:
Q. Do you know anything about estuaries?
A. I have studied estuaries.
Q. And have you taught about estuaries?
A. Pardon?
Q. Have you taught about estuaries?
A. Yes, I taught about estuaries.
MR. BLACKBURN: I offer Dr. Sass as a biogeochemical expert in earth systems, including hydrologic and ecological aspects and the statistical analysis of those phenomena.
MR. WILLIS: No --
THE COURT: Sorry?
MS. ROBB: No objection.
MR. WILLIS: None from the State, Your Honor.
THE COURT: Then he's accepted as such. Thank you.
BY MR. BLACKBURN:
Q. Now, with regard to this lawsuit, what did TAP ask you to take a look at? Help us understand.

A. To look and see if there's any relationship between fresh water inflow and whooping crane mortality.
Q. And when did you begin, first begin to investigate whether there was such a relationship between fresh water inflows and whooping crane mortality?
A. Very early in 2009.
Q. And when you began, when you first began your investigation, were you aware about the deaths of whooping cranes at Aransas during 2008-2009?
A. Yes, I was.
Q. And --
A. And also in 1990.
Q. I'm sorry?
A. And also in 1990.
Q. Now, let me --
THE COURT: What happened in 1990?
THE WITNESS: These are two of the high mortality rate years.
THE COURT: Two -- oh.
THE WITNESS: Yes.
THE COURT: Okay.
BY MR. BLACKBURN:
Q. So it wasn't just 2008-2009?
A. No.
Q. And let me show you Exhibit 11. And let me ask you if you

recognize this document.
A. Yes, I do.
Q. And what is it?
A. It's the International Recovery Plan of the Fish and Wildlife.
Q. Have you been sitting in the audience during this trial so far?
A. Yes, I have, but I have seen it before that.
Q. Okay. And did -- what -- did you review this document as part of the work that you were engaged to do?
A. I did.
Q. And did you look at other documents as part of your investigation?
A. Yes, I did.
Q. And could you describe the documents that you reviewed, in a broad, general sense?
A. In broad, general literature, publications from Fish and Wildlife. In general background literature, I published a paper on the whooping crane with the Baker Institute, and in there there's a bibliography which covers the majority of what I read, I think.
Q. And based on your review of this literature, did you identify a relationship that was worthy of investigation from a statistical standpoint?
A. Yes, I did.

Q. And what potential correlation did you determine that merited statistical investigation?
A. I hypothesized that there was a reverse or inverse correlation between river flow, or fresh water inflow finally, and whooping crane mortality. By "inverse correlation" I mean the higher the river flow, the lower the mortality, and vice versa.
Q. And what source of data did you use for mortality?
A. I used Tom Stehn's data for mortality.
Q. And did you have conversations with Tom Stehn?
A. Yes, I did.
Q. And did you evaluate from your own standpoint the reliability of Tom Stehn's information?
A. In my impression, he did a wonderful job.
Q. And from the standpoint of your inflow data, what were the sources that you used for your inflow data?
A. Originally I used just the river flows from the USGS gauge stations at --
Q. Okay. And did --
A. -- Tivoli and Victoria.
Q. And then subsequently, did you gain additional data?
A. Yes, I did.
Q. From whom?
A. The Texas Water -- I'm not going to remember the name of that bunch -- Development Board.

Q. Good. Now, I would like to have Plaintiff's Exhibit 74. And in fact, if you could just kind of zero in on --
A. Thank you.
Q. -- the top of the document. What is shown in Exhibit 74?
A. These are my data. The year is given in the first column. The July through December flow into San Antonio Bay in acre feet in the second column. The whooping crane mortality in the winter as a percentage of the flock, and then the last line or column, the whooping crane mortality in actual numbers in the winter.
Q. So as part of your research, one of your first steps is just simply to kind of put the data together in this type of format?
A. Yes, essentially.
Q. And there are some of the whooping crane mortality numbers that are highlighted in red. Do you see that?
A. Yes.
Q. Why did you have some in red and others in dark?
A. Those are the ones that I considered to be a higher than normal mortality. I figured that, as has been pointed out earlier today, that there are natural ways for whooping cranes to die. They live for 15 to 30 years on average, and we would expect some of those deaths to occur naturally at Aransas.
Q. So would it be fair to say that you were trying to segregate what you would think might be some, a year with an

external factor, as opposed to a year with just sort of what you'd expect to be normal comings and goings of whooping cranes?

A. Yes, I'd say that's correct.

Q. And then you have your actual numbers on the far column. Is that correct?

A. Yes.

Q. And after you prepared this chart, did you recognize that it had some minor errors in the data?

A. Pardon?

Q. Did you recognize that there were some minor errors in the data?

A. Oh, yes. That always happens. I'm sorry about that.

Q. And did you correct those?

A. I did.

Q. And did you later prepare a chart of this information?

A. Yes.

Q. And would you look at Exhibit 266, please. Might be out of sequence. And I would ask you, do you recall at a later point in your work completing this table which is called Supplemental Table Number One?

A. Yes, this supplementary table, which is the latest data that I could find, both on mortalities and river inflow.

Q. Now, if in the chart that we're about to show, if in 1991 you are showing on that chart 7.8 percent, would 7.8 percent on

this upcoming chart be a correct number?
A. Yes, that's a correct number.
Q. I'm sorry. What does the Exhibit 266, the one that's up, show for 1991, 1990-1991, for the percent?
A. It says 7.5 here.
Q. So if it's 7.8 on the other chart --
A. Yeah, that was a mistake.
Q. So it would be off by three-tenths of a percent?
A. Yes.
THE COURT: What is off?
MR. BLACKBURN: I'll show you in a minute, Your Honor. I just -- it's not up yet.
BY MR. BLACKBURN:
Q. And I would also ask you, for 1991-'92, if the -- for 1991-'92 --
A. I believe that was .5 before.
Q. Okay. Now, have you analyzed whether in fact these differences have altered your analysis in any way?
A. Not at all.
Q. Okay. I would like to see the Exhibit 76, please. Now, if you would zero in on that, and let me ask, this is a graph that took me a while to grasp. First of all, across the bottom, what are you showing?
A. Those are years.
Q. And so these would be years '89 to '90, '99 to 2000,

et cetera?
A. They're years of increasing fresh water inflow.
Q. So if you look at the blue lines, the blue lines are going up.
A. Yes.
Q. Is that correct? And if you look at the column on the, at the vertical axis at the numbers on the far left-hand side, it says, "1, 2, 3, 4."
A. Those are millions of acre feet for that year.
Q. So in terms of relating to the blue columns, the "1" would mean 1 million acre feet of inflow?
A. Yes, sir.
Q. All right. That's a little bitty blue line there.
A. A very bitty blue line.
Q. So that would be inflow during what period of time?
A. Well, it says in the bottom, "1989 to 1990."
Q. And then the blue up at the top says that that's inflow in millions of acre feet for the period of what?
A. 2002 to '03.
Q. No, I'm sorry, at the top of the graph, it talks about July through December, does it not?
A. Yes. Oh, I thought you meant the last line. I'm sorry.
Q. I understand. I knew you weren't following me. But your '89-'90, '99-2000, each of those blue columns is for a period from July to December?

A. July to December.
Q. For that, for that year?
A. For that year, yes.
Q. And that would be --
THE COURT: Okay. Blue is the acre fresh water influx?
MR. BLACKBURN: Correct.
THE COURT: And the red is the crane mortality.
BY MR. BLACKBURN:
Q. Yes. And what unit is being used for crane mortality?
A. That's percentage.
Q. So that's percent of the flock that perishes during the winter of '89 and '90, versus inflow for the period of July to December for what year?
A. I beg your pardon?
Q. Would that be '89, July through December?
A. Well, the two lines are both for the same year.
Q. I understand. But it says '89 to --
A. '90.
THE COURT: I'm missing -- where's the '89? Oh, there it is.
MR. BLACKBURN: Down at the bottom.
THE COURT: Wait.
MR. BLACKBURN: And --
THE COURT: I don't see '89. '89 through -- '88

through '89?

MR. BLACKBURN: I'm sorry. That is going to be -- may I approach this over here to --

THE WITNESS: The very first one --

THE COURT: You can point to it. You can do it with your finger tip on that.

MR. BLACKBURN: Okay. Oh, I can just -- okay, great.

THE COURT: See, isn't that wonderful?

MR. BLACKBURN: That is wonderful.

THE WITNESS: I thought you said I could do that up here.

THE COURT: You can.

MR. BLACKBURN: You can.

THE WITNESS: I can?

THE COURT: Yes, you can.

THE WITNESS: With what? With my finger tip?

THE COURT: Your finger tip. Wait a minute, let me take his off. Okay.

MR. BLACKBURN: So you can now touch it --

THE COURT: Oops. I can't clear that off.

MR. WAITES: I'm sorry, I did that, Your Honor. I've taken it off.

THE COURT: Okay.

THE WITNESS: It's not working with my finger tip.

THE COURT: It's off.

THE WITNESS: Now I can try it?
THE COURT: Now do it.
THE WITNESS: It still doesn't work.
THE COURT: Ms. Cayce, would you help?
(PAUSE.)
THE WITNESS: I'm getting something.
THE COURT: What color do you want it? How's that?
THE WITNESS: A little recalcitrant, but it's working.
THE COURT: Okay.
BY MR. BLACKBURN:
Q. Okay. Well, you have just circled, or somebody has --
THE COURT: He did.
BY MR. BLACKBURN:
Q. -- in yellow, that would be 80 -- is that -- what year is that? 1989 to 1990?
A. That's the year '89-'90, which is July through December of '89.
Q. It's July through December of '89, and it's the mortality over that, over winter period of '89-'90?
A. Yes. Whatever that winter period is, generally from November up through February or March.
Q. So --
THE COURT: So you said the big years were 1990-'91 and 2008-2009.

THE WITNESS: Yes.
BY MR. BLACKBURN:
Q. Now --
A. Those are, the tallest red lines are those two years.
Q. So would you draw a circle around the top of the biggest red lines, the two?
A. I'm going to try. Got to do it slowly.
THE COURT: You can.
BY MR. BLACKBURN:
Q. And the other one?
A. And here's the other one.
Q. At least partial anyway.
A. It's -- it was a good attempt.
Q. So in 19, the one on the far right, 19 --
THE COURT: Try the pen.
THE WITNESS: Ah.
THE COURT: How's that?
THE WITNESS: No, that doesn't work.
THE COURT: Let me clear it off, you can start again. Go ahead.
THE WITNESS: I'll try my fingers. Oh, that works better.
THE COURT: It's a wonderful toy.
MR. BLACKBURN: I was going to say, I think you can entertain Dr. Sass all afternoon and --

THE COURT: We come in at night and play with it.
BY MR. BLACKBURN:
Q. Now, just to help me read the graph, first, let's start with 2008-2009. If you come across the top from the red line in the middle of the circle and come across to the vertical axis, what percent mortality do you find?
A. It's about 8½ percent.
Q. And if you go to 1990-'91 and you come across, about what do you get?
A. Oh, about 7.85, something like that.
Q. Well, I'm going to ask you to look at 1993-'94 and draw a circle around the top of the red line there. And if you come across, what do you get there?
A. Close to 5, 4.9.
Q. And then 1988-'89, if you'd draw a circle around the top there.
A. I'm having fun with this.
Q. And what do you get there?
A. 4.3.
Q. Okay. Now, let's take that year -- I'm sorry, go ahead and draw all the way over to '89 and '90 and circle the top of that one. And what is that, about what, 3½ percent?
A. About 3.5.
Q. Now, my question to you is, now -- first of all, as a person that looks at data like this all the time, kind of

working with natural systems, why did you array the information this way?

A. I arrayed the information this way so that I could look at least at one variable in a monotonic way. The inflow of fresh water into the system goes up as you go across from left to right. Then I wanted to see, where does the whooping crane mortality fall on this, on this kind of graph.

Q. And just off the top of your head, what jumped out at you on, when you looked at this as a sign?

A. A couple of things. One is they divide themselves fairly naturally into two distinct sets. One, very high mortality numbers, which are the long red lines, and the other, rather low mortality numbers, which come in, as you can see here, less than, less than about two, or one actually.

Q. Now, over where we have high inflows, let's take something like -- well, let's just start on the far right corner, 2002-2003. Draw a -- can we change colors?

A. Pardon?

THE COURT: Change colors?

MR. BLACKBURN: Can we change colors?

THE COURT: Yes. Ms. Cayce, would you show him how to change colors?

THE WITNESS: I can change colors.

THE COURT: You can, but you don't know how, so --

THE WITNESS: I don't know how, but I'll --

THE COURT: We'll show you.

MR. BLACKBURN: Let's not teach him either.

THE WITNESS: You don't need that for a Nobel Prize.

THE COURT: Then I guess I'm out.

THE WITNESS: Oh, there's color, and it tells you that here.

THE CLERK: It shows you which one, if you want to switch right here, right in the corner.

THE WITNESS: Okay. Oh, that's not a good color. That's better. What would you like me to do, sir?

BY MR. BLACKBURN:

Q. Far right-hand column, blue. The blue -- oh, no blue --

A. You want the blue or the red?

Q. I want you to just draw a circle around the top of the blue line there.

A. All right.

Q. And then come across all the way to the graph, or to the numbers on the far left side. And so what does the top of the blue line over in 2002-2003?

A. It tells for that year I had about 5.4 million acre feet of water flow.

Q. And then you have circled the mortality on that year?

A. And --

Q. What is that?

THE COURT: I'm going to undo the last two notations

so he can --

MR. BLACKBURN: Okay. You can go ahead and put --

THE COURT: Circle that top one again on the right. The blue, the blue top on the right.

MR. BLACKBURN: The top of the blue. There we go.

BY MR. BLACKBURN:

Q. Now, the corresponding red that goes with that very tall blue is about what?

A. About .5 percent.

Q. And as a biogeochemist looking at this type of information about the natural system, I think you were saying that it suggested to you what?

A. It suggested to me that high mortality was all shifted over to the left-hand side. Those are years of low inflow. Now, there's low mortality over there also.

Q. What does that tell you?

A. That tells me that not every year do the whooping cranes, that many whooping cranes die.

Q. Even if the flows are low?

A. Even if the flows are low.

Q. So does that confound you as a biogeochemist? Does it bother you that --

A. No, not at all, no.

Q. Why?

A. Well, as has been pointed out by George that there is a

natural variability. As a matter of fact, if you look at the probability distribution, around the average, say, of some biological number, the most probable value might be something like 40 percent, 30 percent probability. Never 100. And so the chances of having a low mortality are low maybe, but they're there.

Q. So once you had sort of arrayed this information like this, as a scientist, what did you do next?

A. Well, I formed a hypothesis. You look at your data, you look at the literature, you look at the various biological factors that are involved in the system you're looking at, and you were looking at the question also, what is the relationship between fresh water inflow and mortality. And my hypothesis is that high mortality is associated with low fresh water inflow.

Q. And how did you test that?

A. Well, what this is naturally doing is dividing the data up into yes and no answers. Is the mortality high? Yes. Is the mortality low? No. Is the mortality high during high river flow, or is the mortality low during high river flow, or low or high during low river flow? So there are four ways of arranging these data: High flow, high mortality; high flow, low mortality; and then the inverse two of those.

Now, when you have a set of data like that, which is nonparametric, but which is --

Q. Whoa, whoa, whoa.

A. Whoa, whoa, whoa.
Q. Nonparametric?
A. Nonparametric, which is not, does not have a functional relationship between the two variables. X is a function of Y, that sort of thing. But they fall into categories.
Q. And then what do you do?
A. This is the same sort of data that you have when you have, does a drug work? Yes. Did the patient die? No, the patient didn't die. Yes, the patient got well; no, the patient didn't get well.

And so what you do is, is test the probability of whether or not this is really true, or whether it's just a random sampling of what's to be expected.

Q. So how do you go about testing whether this is true or not? I'm sorry.

THE COURT: Did you want this to be an exhibit?

MR. BLACKBURN: Oh, we can do that, can't we?

THE COURT: Can you do that, Ms. Gano?

MR. BLACKBURN: That would be excellent. And we would label it --

THE COURT: Oh, we're having a print problem.

MR. BLACKBURN: How would you like --

(Court and Clerk conferring off the record.)

THE COURT: Just leave it there until we can get that.

MR. BLACKBURN: Okay. And this is exhibit, Plaintiff's 76. Can we call it Plaintiff's 76A? Or how would you prefer numbering?

THE COURT: 76A is fine. Can you print out that exhibit? Have we got film in there?

(Court and Clerk conferring off the record.)

THE COURT: You can put that on, again, a memory stick and we can print it off. Because it's not on our document camera, we can't print it. But we can print it off of your memory stick, if you can put that on a memory stick.

MR. BLACKBURN: Oh, good.

THE COURT: Have y'all got memory sticks?

MR. BLACKBURN: We do.

THE COURT: Can you stick it on a memory stick, and we'll take it and print it?

MR. BLACKBURN: Okay.

MR. WAITES: Stick it down in the port down there?

THE COURT: You don't have one that you can just put on the overhead document camera, do you? Oh, never mind. It's already -- it's done. Let's get a memory stick and take it to the printer.

MR. BLACKBURN: I'm not going to be using another exhibit at least for a bit, I don't think.

THE COURT: Okay.

MR. BLACKBURN: Or I may, may not. Can we switch

it --

THE COURT: It's just such wonderful work.

THE WITNESS: Pardon?

THE COURT: It's such wonderful work, I don't want to lose it.

THE WITNESS: Well --

MR. BLACKBURN: Don't touch it again.

MR. WAITES: Your Honor, we're unclear on whether we would put the stick in something up here or --

THE COURT: No, we'll take the stick.

MR. WAITES: Okay. I need to get the image off of our system first. Is that correct?

MR. BLACKBURN: No, you've got to --

MR. WAITES: Oh.

MR. BLACKBURN: She's going to print it off of their, put it from theirs onto the stick.

MR. WAITES: Oh, no.

MR. BLACKBURN: We don't have a copy of this.

THE COURT: Oh, okay.

MR. BLACKBURN: At least we don't have a copy of the one with the circles on it. Right? Can you save that onto a memory stick?

THE COURT: Is Leland coming up? We're getting somebody up to see what we can do. Okay? When we print the new exhibits, they're usually from our overhead document

camera. It's my fault. So let's see what we can do.

MR. BLACKBURN: Well, we'll see what we can do, Your Honor. And in the meantime, I think I can carry Dr. -- can we put this down at some stage --

THE COURT: No, let's just leave it there.

MR. BLACKBURN: -- without losing it? Or would we lose it?

THE COURT: Is that it?

MR. BLACKBURN: Well, this is the original.

THE COURT: Put it on the overhead document camera. Let's switch.

MR. BLACKBURN: Oh, I see.

THE COURT: And have him do that great work on that.

MR. BLACKBURN: Can you, oh, I can --

THE COURT: Can you do it again?

UNIDENTIFIED SPEAKER: Jim, just let it sit still, and then he can draw on there.

THE COURT: Would you bring up the red again for him, bring up the blue color? Zoom it up, please.

(Counsel conferring off the record.)

MR. BLACKBURN: Okay.

THE COURT: Now center it.

MR. BLACKBURN: There we go.

THE WITNESS: Okay.

THE COURT: It's not in color. Why is it not in

color? Is the contrast bad?

MR. BLACKBURN: The contrast isn't good, but the --

THE COURT: Can you fix the contrast, Ms. Cayce?

MR. MUNDY: Judge, on the monitor, it's showing the blue and the red. It's just I think the projector screen is not --

THE COURT: Okay. All right. Let's see what happens. I think it's going to print from there. We'll see. Can you recreate -- there it goes. Thank you.

MR. BLACKBURN: Okay.

THE COURT: Can you recreate his colors on the screen?

MR. BLACKBURN: I believe that I had asked you --

THE COURT: Do you know how to pick your colors again?

THE WITNESS: I'm trying to get a color back here.

MR. BLACKBURN: You used red, I believe, on the --

THE COURT: Red on blue.

MR. BLACKBURN: And yellow on the others.

THE COURT: Yellow on the red.

THE WITNESS: Well, I can't find yellow, but I'll find green. How about that?

THE COURT: There you go. That's fine. Okay.

MR. BLACKBURN: Well, green's close to yellow.

THE COURT: Green is good.

THE WITNESS: Close as I can get.

MR. BLACKBURN: And you circled, I think there were five that we circled.

THE COURT: There were five, because it was like a basketball team.

MR. BLACKBURN: And the other one was on the far left.

THE COURT: This is why I'll never get a Nobel Prize.

THE WITNESS: You want me to do one more here on the green?

THE COURT: All I can do is circles and Xs.

THE WITNESS: Okay.

THE COURT: One more on the far left for the green.

MR. BLACKBURN: And the green far left.

THE WITNESS: No, you don't want green.

THE COURT: Yes.

MR. BLACKBURN: Yes, on the far left.

THE COURT: The far left.

THE WITNESS: Oh, oh, okay.

MR. BLACKBURN: The other, other left.

THE WITNESS: This one.

MR. BLACKBURN: Yes, sir.

THE COURT: That's it.

MR. BLACKBURN: That's it.

THE COURT: Now you can switch to red.

THE WITNESS: Ah.
MR. BLACKBURN: There you go.
THE COURT: There you go.
THE WITNESS: And you want the blue in there.
MR. BLACKBURN: The one following --
THE COURT: The far right one was, that's it.
MR. BLACKBURN: That was the only one you circled. Okay.
THE COURT: Now you can print that out.
We need to print out that exhibit from the overhead document camera. We need to print it out.
SYSTEMS TECHNICIAN: Okay.
THE COURT: Not there. It's over -- there's a camera function here.
SYSTEMS TECHNICIAN: Right. I don't know --
THE COURT: You don't know where it is?
(Court and Technician conferring off the record.)
MR. BLACKBURN: Well, we can just leave this one here and then can go back to the monitor here, and we'll have this preserved.
THE COURT: You know what, you can just hand it to him with color pencils.
MR. BLACKBURN: We will take --
THE COURT: And we'll get it done that way.
MR. BLACKBURN: We can take care of this, Your Honor.

We have now replicated it twice. I feel --

THE WITNESS: I could probably do it again.

BY MR. BLACKBURN:

Q. I think you can, but I'm, you know, don't want to overreach here.

Now, what we were talking, we were talking about this image, and basically I was asking you, once you have arrayed your data like this, what was your next step? And you may have told me, but I'm going to ask you to repeat kind of where you go from here, so --

A. Well, I told you I was now forming a hypothesis, and the hypothesis is that the data fall into these four categories.

Q. So what do you do next?

A. And then I tested whether or not that was a true hypothesis or -- so I used the Fisher test.

Q. Now, what is the Fisher Exact Probability Test?

A. The Fisher Exact Probability Test tests this kinds of data, that is to say what the Fisher does is say the distribution of arrangement that you have here, in terms of whooping crane mortality and flow for particular years, and the number, is either -- well, how do I put this? The Fisher test assumes that it's the null hypothesis, which says that they're not related.

Q. So you made, you start off with an assumption?

A. You start off with the assumption that they're not

related, and then say what's the probability of getting the distribution that you get if it's not related.

Q. And did you conduct the Fisher probability test?

A. And I conducted the Fisher test, and it told me that if these data are not related, I have a 2 percent probability of the data falling in this fashion.

Q. So stated otherwise, what does it mean?

A. It says that I'm 98 percent confident that my hypothesis is correct.

Q. Now, what level of correlation do scientists typically use to establish statistical significance?

A. A really good statistical significance is 95 percent or better.

Q. Yeah, in the biological world, how do you consider a 95 percent --

A. I consider it pretty exceptional, really, that you can get 98 percent probability.

Q. So you would call 98 percent probability of outcome --

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Thank you, Leland.

THE WITNESS: I would call it beyond expectation.

BY MR. BLACKBURN:

Q. So 98 percent is extremely good.

A. Yes.

Q. Did you also consider other periods of fresh water inflows

and evaluate the statistical significance of their relationship? This was -- your 98 percent relationship came out in the July to December time period.

A. Yes.

Q. Did you consider others? And how did they come out?

A. They all came out better than 95 percent. And the ones I used were a variety, ranging from a full year to partial years, to the year, the part of the year that the whooping cranes were there, versus the part of the year here, prior to the arrival of the whooping cranes and so on.

Q. And in all cases, it showed up that low inflows were related to high mortalities, at a greater than 95 percent relationship.

A. Yes.

Q. Now, did you rerun this analysis once the new data was provided to you that is shown on 75?

UNIDENTIFIED SPEAKER: Could we please --

UNIDENTIFIED SPEAKER: It's 266.

THE COURT: Did you want to label that one, that other exhibit, 76A? Is that what you said?

MR. BLACKBURN: It has been marked as Exhibit 76A.

THE COURT: Any objection?

MR. BLACKBURN: I now offer this.

MS. ROBB: Your Honor, no objection.

THE COURT: 76A is admitted.

MR. BLACKBURN: And should I return it?

THE COURT: Thank you. Now, you want to turn it back to the computer again? Thanks.

(Counsel conferring off the record.)

BY MR. BLACKBURN:

Q. Now, did you run also your Fisher probability test substituting in different flow data and updated flow data that was provided to you?

A. Yeah, and also the additional two years of data that we had.

Q. And the additional two years of whooping crane mortality were also added in.

A. Yes.

Q. Is that right?

A. Uh-huh.

Q. And when you ran the probability test for those new numbers, how did it come out?

A. It was not significantly different from what I had before.

Q. So at the conclusion of your statistical analysis, what is your opinion about the correlation between low fresh water inflow and high mortality?

A. That they're causally correlated.

Q. Now, what do you mean by "causally correlated"?

A. That in all cases of high mortality, you have low river flow, no exceptions really.

Q. And now the statistics support the correlation. Does the science support a correlation?
A. Well, I -- yes. Scientifically, after reviewing the data on this estuary and on the whooping cranes, I had a very strong hunch that this is the way it was going to be correlated, and that stands to biological reason. Most of the other causes of death, let's say, I put those into two categories. And those are, those that are directly caused by some external happening, like shooting, or those that are as a result of stress caused by low river flow, or low inflow of fresh water.
Q. So based on your statistical analysis and your study and knowledge of cranes and estuarine ecology, do you have an opinion on causal relationship between both fresh water inflows and crane mortality?
A. Yes. My opinion is that they're causally correlated in an inverse fashion, low river flow, high mortality, and vice versa.
MR. BLACKBURN: Thank you, Your Honor. I'll pass the witness.
THE COURT: Thank you. Was your Nobel Peace Prize for your body of work or for something in particular?
THE WITNESS: It was the body of work of the IPCC. My role is I was a charter member of the IPCC, and I was an author of a study which developed a model for countries to use to report their greenhouse gas emissions from wetland systems.

THE COURT: Thank you.

CROSS-EXAMINATION

BY MS. ROBB:

Q. Good afternoon, sir.

A. How do you do?

Q. Dr. Sass, I'd like to talk a little bit more about your work in --

A. Could you speak a little louder, please? I am somewhat hard of hearing.

Q. Of course. Is this better?

A. That's better.

THE COURT: I can also, if you would prefer, we have headphones that magnifies the sound. Would that be helpful?

THE WITNESS: Well, hopefully I'm that not -- not that hard of hearing.

THE COURT: I use them.

THE WITNESS: Well, we'll see.

THE COURT: All right.

THE WITNESS: Okay. If I do, I'll ask you for them. Okay?

THE COURT: Okay. Just let me know if it would be helpful.

BY MS. ROBB:

Q. You haven't done any field studies related to whooping cranes, have you?

A. I have not done any field studies.
Q. And you haven't performed any necropsies on whooping cranes.
A. No.
Q. You haven't reviewed any necropsies from any dead whooping cranes from --
A. I haven't reviewed what?
Q. Any necropsies?
A. No, I have not.
Q. And as of your deposition on October 24th, you were not aware that any necropsies existed for dead whooping cranes from Aransas. Correct?
A. I have not reviewed any, no.
Q. And you haven't taught any courses about whooping cranes?
A. Per se?
Q. Yes.
A. No.
Q. You have --
THE COURT: But -- did you want to say something else about that?
THE WITNESS: Well, I've given courses on wetland systems and mentioned the whooping cranes in passing, but not, not in any great detail.
BY MS. ROBB:
Q. And you haven't designed an aerial survey for the purpose

of counting whooping cranes?
A. No, I haven't.
Q. Have you ridden along on an aerial survey for the purpose of counting whooping cranes?
A. No.
Q. Have you been asked by anyone for your views on the validity of an aerial survey done for the purpose of --
A. No.
Q. -- counting whooping cranes? You haven't done any field studies of fresh water inflows in the Guadalupe/San Antonio Bay estuary, have you?
A. No.
Q. And you have not taught any courses specifically on hydrology?
A. Not per se.
Q. You haven't done any sampling in the San Antonio Bay estuary?
A. No, I don't believe so.
Q. Now, you compared whooping crane mortality numbers from Mr. Stehn to inflow numbers yearly. Isn't that right?
A. Yes.
Q. And in doing that, you took the Stehn numbers in your first two reports as they were, without going back to see what the causes of death were that had been identified. Correct?
A. That's correct.

Q. And you didn't pull out any mortality numbers in the first two reports based on established causes of death, did you?
A. No.
Q. And you haven't read the literature and come to any conclusions about the diseases of whooping cranes, have you?
A. In part I have, yes. I did not find any definitive work on any kind of pandemic diseases in this flock, so --
Q. When did you do that reading?
A. Oh, God --
THE COURT: You mean the research?
MS. ROBB: Yes.
THE COURT: Okay.
THE WITNESS: Probably 2009, somewhere around in there.
BY MS. ROBB:
Q. Let me show you what you said in your deposition at Page 29. Do you see where I asked you, "I mean, have you ever read the literature and come to conclusions about the diseases that whooping cranes might be susceptible to?" And you said, "No, not particularly"?
A. No, I had not come to any conclusions, no.
Q. All right. In considering the relationship between inflows and mortality, you would consider it relevant to know whether there was a big die-off in the flock in a particular year just prior to getting to Aransas, based on disease,

wouldn't you?
A. Would you repeat that again?
Q. Sure. It's a little bit long. In considering the relationship between inflows and mortality, as you did in your analysis, you would consider it relevant to know whether there was a big die-off in the flock in a particular year just before getting to Aransas, based on disease, wouldn't you?
A. You mean during the summer nesting season, or during migration, or both?
Q. During migration to Aransas for the winter.
A. Yeah, I could not find anything definitive there.
Q. Well, let me show you what you said in your deposition on Page 60. Here I asked you, "In thinking about the relationship between flow and mortality, would you consider it relevant to know whether there was a big die-off in the flock just prior to getting to Aransas in the winter from disease?" And do you see that you said, "I would suspect so, yes"?
A. Yes.
Q. Is that still your testimony?
A. Well, it would be relevant, yes.
Q. You didn't consider that in your analysis that you've presented here today, did you?
A. I didn't find any reason to, no.
Q. Now, you said you agree that a Fisher Exact Probability Test is normally used when you've got an either/or set of data.

Right?
A. Yes.
Q. And you don't consider yourself to be a statistician, do you?
A. Qualify that for me, will you? What does it mean to be a statistician?
Q. Well, let me show you what you said --
THE COURT: Do you use statistics in your work?
THE WITNESS: Pardon?
THE COURT: Do you use statistics in your work?
THE WITNESS: Yes, I use statistics in my work.
THE COURT: Does your work heavily rely on the use of statistics?
THE WITNESS: I would say mediumly heavy, yes.
THE COURT: And are these statistics you yourself create and --
THE WITNESS: I have published other statistical works.
THE COURT: Thank you.
BY MS. ROBB:
Q. You agree, don't you, that the whooping crane population that winters in Aransas is essentially constantly increasing. Right?
A. Yes.
Q. Now, when you ran your data sets for the first two

reports, you chose four runs that deal with the July to December time frame. Isn't that correct?
A. Yes.
Q. And you, you ran other runs as well at that time, did you not?
A. Yes, I did.
Q. And you erased the other runs from your computer, didn't you?
A. I'm not sure -- yes, I did.
Q. But you kept the data for the four graphs you included in your report. Correct?
A. Uh-huh. Yes.
Q. And the P or probability values for the runs you threw away and erased were different from those you included in your report, weren't they?
A. Yes.
Q. You picked the best case, didn't you, out of all the runs?
A. I certainly did.
Q. And you assumed that the whooping crane mortality you used in your Figure 2, which has been marked Plaintiff's Exhibit 74, that you were just talking about with Mr. Blackburn, you assumed that the whooping crane mortality is related to bird stress based on lack of water, didn't you?
A. Based on lack of water?
Q. Yes, based on, based on low inflows.

A. Based on low inflow, yes.
Q. Yes. Let's look at Plaintiff's Exhibit 74, the Figure 2 from your amended expert report, which was dated August 31 and further supplemented on November 18th. This is the same document that you were just looking at with Mr. Blackburn.
You said that you relied on Mr. Stehn for the mortality numbers that you listed here in Figure 2. Correct? The whooping crane winter mortality numbers?
A. Yes.
Q. You relied on Mr. Stehn's numbers for Figure 2. Correct?
A. Yes.
Q. Were you aware when you relied upon these numbers that in two separate years these mortality numbers included a single crane that was presumed dead twice and subsequently found to be alive through color banding?
THE COURT: Well, if he's still presumed dead, that would be three times. Right?
MS. ROBB: You're right, Your Honor.
THE WITNESS: What year was that?
THE COURT: And I'm not -- my point is I'm not getting what you mean "presumed dead twice."
MS. ROBB: Well, my point is that these numbers include a crane that --
THE COURT: That was counted twice.
MS. ROBB: No, he was missing twice. The crane was

missing twice, and then showed up in two separate years. So he was counted as dead --

THE COURT: Is he banded?

MS. ROBB: He's banded.

THE COURT: Okay.

MS. ROBB: And they finally figured it out.

THE COURT: So is that one or is that several that we have?

MS. ROBB: It was the single crane, but in two separate years the numbers are off because he was missed.

THE WITNESS: Would you tell me which two years you're talking about?

MS. ROBB: You know, I don't think I wrote that down here. I can't tell you.

THE COURT: So that explains why he's presumed dead twice, in two separate counts. I got it. Thank you.

MS. ROBB: All right.

BY MS. ROBB:

Q. You didn't look behind Mr. Stehn's numbers to analyze whether there were any that were counted, put back in, did you?

A. I took his numbers as they were published.

Q. Okay. And your original analysis included counting two cranes that had been shot dead. Right?

A. No.

Q. Did you look to see if --

A. Those, the deaths, the shooting deaths that I found were not on the Aransas site, or were not during the time that the cranes were at Aransas, except for one. And I can't recall what year that was in.

THE COURT: There was one, I know it was a lawyer out of Houston, shot a crane in the wildlife refuge.

MS. ROBB: Uh-huh.

THE WITNESS: There was a --

THE COURT: I remember his name, too, but I can't remember -- I think that was before I got on the bench, so it was before '94.

MR. MUNDY: I think it was like '90 or so, Your Honor --

THE COURT: Okay.

MR. MUNDY: -- if my memory --

BY MS. ROBB:

Q. But in any event, Dr. Sass, you didn't go back in your original analysis, look behind the numbers to see what potential causes of death that would have ruled out low inflows before you did your Fisher Exact Probability Test, did you?

A. The only real cause of death that I did look into was shooting. I wanted to make sure there were -- there were several cases of shooting. And to the best of my knowledge, the ones I found were not during the winter season in Texas, but during migration. There was one up near Dallas, as the

birds were migrating down, and I did not count that as a death, no.

Q. Do you recall whether the bird was shot in migration and died at Aransas?

THE COURT: Shot in Dallas and flew to Aransas?

BY MS. ROBB:

Q. Do you recall?

A. I don't -- I would not have expected that, no.

Q. All right. Let's go --

THE COURT: Just a flesh wound?

MS. ROBB: Just a flesh wound --

THE COURT: Gosh.

MS. ROBB: -- that turned into a mortal wound, I guess.

Let's go to Plaintiff's Exhibit 154. And my understanding, Mr. Blackburn, is that there, that this has now been admitted.

MR. BLACKBURN: Is that true?

MS. ROBB: Yes.

BY MS. ROBB:

Q. Have you ever seen this document before, Dr. Sass?

A. Actually, I haven't.

Q. All right. This is a Fish and Wildlife Service spreadsheet, it's a Fish and Wildlife Service spreadsheet that Carey Strobel of the Fish and Wildlife Service put together.

And it identifies cranes' known mortalities, they call it at Fish and Wildlife Service, between 1951 and 2009. Let's just take a look at it for a minute. You can see at Page 1, which is up on your screen --

THE COURT: Why don't -- you want to look at that in your hand and study it for a bit, or study it on the screen first?

THE WITNESS: No, that's okay.

THE COURT: Okay. I mean, he's never seen it before. I just didn't want him to --

THE WITNESS: I can see what's here so far.

THE COURT: Okay. Are you comfortable with that, what's going on then?

THE WITNESS: This goes up to 1998.

BY MS. ROBB:

Q. Yes. I was just saying that. Let's look at Page 1, which is through 1998, and then we're going to show you Page 2 --

A. All right.

Q. -- which takes us through 2009. And now let's go back to Figure 2 of your report, Plaintiff's Exhibit 74.

MS. ROBB: May I have the amended? Now, Your Honor, I apologize --

THE COURT: Is this one of those demonstrative things?

MS. ROBB: This is one of those demonstrative things.

THE COURT: Okay. Have you seen it?

MR. BLACKBURN: I have not seen it presented in this way, no, Your Honor.

THE COURT: Okay. You need to give it to them first. I'm not going to let you use it until, unless it's admitted without objection. So take it down. Thank you.

MR. BLACKBURN: It doesn't have the yellow.

MS. ROBB: It doesn't have the yellow?

MR. BLACKBURN: There's no yellow on it, unless I'm color blind.

MS. ROBB: No, there's no yellow on it.

(Counsel conferring off the record.)

MS. ROBB: Your Honor, may I use -- may I offer this set of data, Figure 2, with the additional Fish and Wildlife Known Mortalities as a hypothetical, and use it as a hypothetical with the witness?

MR. BLACKBURN: I'm sorry, Your Honor, the way the exhibit is presented, it's presented as factual information. I just haven't had a chance to check it. This is the first time I've --

MS. ROBB: I understand.

THE COURT: Y'all need to make sure you exchange your demonstrative evidence and see if there are any problems with that, so that each side can examine underlying data used to create those exhibits and see if there are any challenges. So

don't do that.

MS. ROBB: Yes, Your Honor. I apologize again. Well, perhaps we could just discuss this as a hypothetical without the exhibit. Let's go back to Dr. Sass' Figure 2, Plaintiff's Exhibit 154.

BY MS. ROBB:

Q. Dr. Sass, could you assume that in the six years you've defined -- well, let me say this. In your analysis, you defined critical flow as less than 670,000 acre feet for the July-December period. Is that right?

A. Yes, that's correct.

Q. And there were ten years that you've identified on your list where the flow was at your critical flow definition. Is that right?

A. Yes.

Q. And you defined high mortality, from Mr. Stehn's numbers, as a 2.7 percent or higher mortality of the flock. Is that right?

A. Actually, the way I looked at it personally was more than five. Five or more. Five or more actual deaths.

Q. Five of count?

A. Yes.

Q. Okay. And that ended up being a --

A. Yes.

Q. -- 2.7 percent of the flock --

A. Yes.
Q. -- for that, for that year. So looking at your Figure 2, ten of the years, those critical flow years, as you define them, six has high mortality as you defined it. And you highlighted those in red. Is that right?
A. Yes.
Q. And that means, of course, that four of the critical flow years did not have high mortality, as you defined it. Correct?
A. Yes, that's correct.
Q. And then you also had a high flow year, 2000 to 2001, with a high mortality, as you defined it. Isn't that correct?
A. Yes.
Q. And that year, there was 857,990 acre feet.
A. Yes.
Q. But a 3.3 percent mortality.
A. Yes.
Q. All right. Assume for these six years that for 1988, '89 -- and I'm not going to test you on this, so you don't have to remember these. I would like to give you a general sense of it --
A. All right.
Q. -- as a hypothetical. Assume for me for these years, that in 1988 to '89, instead of Mr. Stehn's six, you had a known mortality of two. And in '89-'90, you're --
A. Wait, wait, wait. You had a known mortality of two?

THE COURT: I'm sorry, where is this exhibit from?

MS. ROBB: This is Dr. Sass' exhibit.

THE COURT: Okay.

MS. ROBB: And it's --

THE COURT: Number what?

MS. ROBB: It is Plaintiff's Exhibit 74.

MR. BLACKBURN: These --

THE COURT: Thank you.

MR. BLACKBURN: I'm sorry. You're not, you're not reading from his chart now. Right?

MS. ROBB: No. I'm giving him a hypothetical.

THE COURT: So this is his chart, though?

MR. BLACKBURN: This is Dr. Sass' --

MS. ROBB: This is his chart.

MR. BLACKBURN: This is his chart. But the question is not about his chart, and that's what I'm objecting to.

MS. ROBB: My --

THE COURT: Sustained.

BY MS. ROBB:

Q. All right. You've assumed in your chart that the mortality counts are accurate, haven't you?

A. Yes.

Q. And if these crane mortality numbers are not reliable, then your bar chart is inaccurate. Isn't that right?

A. No. Depends on what you're talking about. You -- let's

take your six. Now, you said hypothetically, if I had a known mortality of two, what are you talking about with respect to that? I mean, what happened to the other four? Are you telling me that because they were not found, that they should not be counted?

Q. Well, I think, to put it more simply, and to be within the ruling on the objection that Mr. Blackburn made, that I think we should just say that assume that your crane mortality numbers would be lower than they are in the chart that you have put your opinion together on --

THE COURT: So where is this going?

MS. ROBB: I would like to know if Dr. Sass' confidence level in his analysis and his opinion changes.

THE COURT: Well, he used somebody else's mortality rate, and if that's incorrect, his chart would be incorrect. I mean, that's -- is that right?

THE WITNESS: That's -- yes.

THE COURT: That's about it. I mean, that's where we're going? So move on.

MS. ROBB: All right.

THE COURT: I can figure that one out.

MS. ROBB: Thank you. I pass the witness.

THE COURT: Further questions, Mr. Blackburn?

MR. BLACKBURN: Could I take a moment, Your Honor?

THE COURT: You may.

(PAUSE.)

MR. BLACKBURN: We collectively have one question, Your Honor.

THE COURT: Yes, sir.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. The -- plus or minus one bird --

A. Pardon?

Q. Assuming a plus or minus of one bird on the mortality, did you factor that into the way you thought about this?

A. Plus or minus one bird.

Q. Yes.

A. Well, I, in my analysis, I chose two or fewer --

Q. Right.

A. -- to be a natural death situation.

Q. So you made assumptions about that?

A. Yes, and --

THE COURT: Well, he created variables in his statistics. Is that right?

THE WITNESS: Well, the number I chose to start with was five birds. And plus or minus on that would say four, four to six birds. And that's still greater than the two that I said would be under normal circumstances.

BY MR. BLACKBURN:

Q. So plus or minus one bird doesn't make --

A. Doesn't really affect my analysis, no.
Q. So would you --
A. That's the beauty of the Fisher test. It's nonparametric. It doesn't depend on the exact number. It depends on how you categorize your numbers.
Q. And that's, and the analysis itself basically takes those types of data into account?
A. Yes.
MR. BLACKBURN: Thank you. No further questions, Your Honor.
THE COURT: Any questions?
MS. ROBB: No, Your Honor.
THE COURT: Thank you. Is this witness released?
MR. BLACKBURN: Oh, by me? By all means.
MS. ROBB: Yes, Your Honor.
THE COURT: It was an honor to meet you.
THE WITNESS: Thank you very much.
THE COURT: Thank you for your work.
THE WITNESS: Glad to be in your court.
THE COURT: Next witness?
MR. BLACKBURN: May I be so bold as to ask if you'd take an afternoon break?
THE COURT: Well, you're really getting pushy here, Mr. Blackburn. Fifteen minutes?
MR. BLACKBURN: That would be lovely, Your Honor.

THE COURT: Okay. Thank you.

(Recess from 3:23 p.m. to 3:43 p.m.)

THE COURT: Are you ready to call your next witness?

MR. BLACKBURN: Yes, Your Honor. Dr. Kathy Ensor, please.

MS. SNAPKA: Your Honor?

MR. BLACKBURN: Oh, yeah. Oh, wait.

MS. SNAPKA: We have a report, if the Court wishes, or if the Court would like us to tell you later.

THE COURT: Sure.

MS. SNAPKA: Your Honor, Kathy Snapka, GBRA. Mr. Stehn was subpoenaed, and --

THE COURT: Sorry. I'm supposed to be taking these breathing treatments. I brought my machine and forgot the medicine, so -- all day, just terrible.

MS. SNAPKA: Tom Stehn was served with a subpoena, and my office received a call from Justin Tate with the U.S. Department of the Interior, who asked that I speak with him. I got Mr. Blackburn and we got my cell phone on speaker phone, and we explained to him that Mr. Stehn's presence was really necessary, and we were instructed to issue a trial subpoena for him. And he said, he said, "Well," he said, "unless there's an exception that I'm not aware of," he said, "you know, I don't think he can be compelled to testify. However," he said, "I'm going to call John Smith with the U.S. Attorney's Office." And

what he wanted, I think, although he didn't exactly say this, I think that Mr. Blackburn and I sort of inferred that he wanted an opportunity to prepare a little bit, maybe like, I don't know, tomorrow morning or something, for this Court to consider his testimony. But my understanding is that John Smith is on his way over here.

THE COURT: Okay.

MR. BLACKBURN: John Smith's on his way over here. Mr. Stehn reported, at least the report we got, is he was going to put a suit on --

THE COURT: Wow.

MR. BLACKBURN: -- and I presume head this direction. So he's trying to honor the subpoena, but he's also going back through his official channels with Fish and Wildlife. And I think, yeah, the clear preference was if we could at least wait until Mr. Smith had a chance to be heard. And I got the impression, might like a little time to look at the law before they perhaps had to make a presentation before Your Honor. But they're coming.

MS. SNAPKA: And I'm looking out for Mr. Smith. If he comes, I'll meet him and tell him what we --

THE COURT: I can see him.

MS. SNAPKA: Pardon?

THE COURT: I can see him the minute he walks in.

MR. BLACKBURN: Great. That's the --

MS. SNAPKA: Thank you, Your Honor.

MR. BLACKBURN: That's the status.

THE WITNESS: Thank you. I don't know. Y'all can do the research, but my research says I think I can do, I can compel him to testify. The Touhy case was modified by Congress a little bit later, sort of fits in the public realm, needed for the public.

MR. BLACKBURN: Again, Your Honor --

THE COURT: And specifically said no privilege was created.

MR. BLACKBURN: Well, we looked at it, and we're happy to take another look at it. We generally believe he should be subject to the subpoena powers of this, of this Court. We understand the issues. We just chose not to get into that fight.

THE COURT: I don't mind it.

MR. BLACKBURN: I understand.

THE COURT: Somebody else called my office. Who was that, Ms. Cayce? Did you tell whoever it was?

THE CLERK: Yes, Your Honor.

THE COURT: What's her name?

THE CLERK: Kirsten Calhoun. I believe she, she received the notice of resetting, not an actual subpoena. She represented the --

THE COURT: Kirsten Calhoun was, she thought she was

subpoenaed to be here. She's not here.

MR. BLACKBURN: We don't know this person, I don't think.

MR. FERNANDES: Nobody identified them --

THE COURT: Environment Texas?

MR. FERNANDES: I'm sorry, it's not anybody identified on our witness list.

MR. WILLIS: No, never heard of her.

MR. BLACKBURN: Well, now, Environment Texas, I think, is a member of TAP. But I don't know that she -- she should not have been subpoenaed by anyone that would be --

THE COURT: Apparently, it was a notice of resetting, and she told my office it was a subpoena.

MR. BLACKBURN: That's --

THE COURT: And I think Ms. Cayce talked to her further. So her presence is not required in --

MR. BLACKBURN: We'll get the message to Environment Texas.

THE COURT: You will do that? Thank you.

MR. BLACKBURN: Yes, Your Honor.

THE COURT: All right.

MR. BLACKBURN: Excuse me one second, Your Honor.

(PAUSE.)

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Yes, sir.

MR. BLACKBURN: Now, shall we go forward with Dr. Ensor?

THE COURT: Please.

MR. BLACKBURN: I'd like to call Dr. Katherine Ensor to the stand, please. And if you could go right there.

(Witness sworn.)

THE COURT: Go ahead.

MR. BLACKBURN: Now, Dr. Ensor, just the way you answered the question here, you sounded like you have a soft voice. And the Judge had a technique for Dr. Archibald. I think she said to put your -- yeah, there you go. That might help.

THE COURT: Is that comfortable for you?

THE WITNESS: Yes.

THE COURT: Okay, good.

THE WITNESS: That works fine, yes. And I'll try to speak up.

MR. BLACKBURN: That would be --

THE COURT: I think that's fine.

THE WITNESS: Great.

MR. BLACKBURN: That's audible, for sure.

THE WITNESS: Okay.

KATHERINE BENNETT ENSOR, PLAINTIFF'S WITNESS NO. 3, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Would you state your name, please?
A. Katherine Bennett Ensor.
Q. And Dr. Ensor, where do you live?
A. Sugarland, Texas.
Q. And where are you currently employed?
A. Rice University.
Q. And --
THE COURT: Where?
THE WITNESS: Rice University.
THE COURT: Thank you.
BY MR. BLACKBURN:
Q. And how are you employed at Rice? What is your current position?
A. I am professor of statistics and also chair of statistics, and I also direct the Center for Computational Finance.
Q. And now did you prepare a resumé for this trial?
A. Yes. I submitted one of my, a copy of my resumé.
Q. This is Exhibit 256, and can you recognize this as a copy of your resumé?
A. Yes, it is.
Q. And what I'd like to do is just ask you some few preliminary questions about your background, and we're not going to be paging through the exhibit, but just talk --
A. That would take a while.
Q. I understand. It's a big document. Would you give your

academic, your educational background, please?
A. I have both a bachelor's and master's in mathematics from Arkansas State University, and a Ph.D. in statistics from Texas A&M University.
Q. And what did you do after you got your Ph.D.?
A. I spent a year at Texas A&M as a visiting assistant professor, and then I then moved to Rice as an assistant professor and rose through the ranks at Rice and am now chair of the statistics department.
Q. And have you reached any, or have you been given any awards?
A. I have been recognized by many organizations, probably most importantly is I am fellow of the American Statistical Association, which is our national committee, association for statistics.
Q. What does it mean to be a fellow of the American Society of Statistics?
A. It means that you've been recognized for excellence in your contributions to the field of statistics.
Q. And in particular, was there any body of work that you got this award for?
A. Yes. I actually was recognized for my work in environmental statistics in my award.
Q. Now, what courses do you teach?
A. Wow, I teach numerous, a long list of courses. But I, I

teach theoretical statistics. I teach applied statistics. I teach statistical computing. I do -- I have taught numerous courses in environmental statistics. Three years ago I actually developed an undergraduate course for civil and environmental engineers, and so I have been teaching that for the last three years and --

Q. And have you won any teaching awards at Rice?

A. Um, I believe I have. I'm not good at keeping up with awards. I have won mentoring awards, for sure. Yes. Yes, from the graduate association, yes.

MR. BLACKBURN: I offer Dr. Ensor as an expert in statistical methods.

MR. TAYLOR: No objection, Your Honor.

MR. WILLIS: None, Your Honor.

THE COURT: Then you're accepted. Thank you.

BY MR. BLACKBURN:

Q. Now, you're here today on behalf of an organization called The Aransas Project. And one of the earlier things that we asked you to do was to review certain data and to undertake certain statistical evaluation for, on our behalf. And we also asked you to review the work that was undertaken by Dr. Sass. I'd like to turn to Dr. Sass' work first. Do you recall reviewing the work completed by Dr. Sass?

A. Yes, I do.

Q. And did you review his paper, "Grus Americana, a Texas

River"?
A. Yes, I did. I focused specifically on his Fisher's Exact Test and his use of that.
Q. Are you familiar with the Fisher Exact Test as a statistical technique?
A. Yes, it's one of our classic methods in statistics.
Q. And what's your experience with this technique? Do you teach it in your courses or --
A. Yes. I teach both the theoretical and the applied side of the Fisher Exact Test.
Q. Now, in Dr. Sass' analysis, was the Fisher test used appropriately? Did he apply it to the right type of problem?
A. Yes. He set up the problem in a way that it was a dichotomization of the variables, and that is the, that is the type of situation where you would use the Fisher Exact Test to understand whether there is a relationship between two variables or not.
Q. Okay. And are you aware there had been some slight modifications and changes to Dr. Sass' underlying data that was reviewed?
A. Yes, I was subsequently given a copy of his, his revisions of the --
Q. The modified table?
A. The modified table, and I have examined that as well, yes.
Q. And now with regard to the revised information, did you

review again whether the Fisher test had been applied correctly?
A. I did, yes, and I believe that he's making very good use of the Fisher test.
Q. Could you explain your understanding of what the result was coming out of the Fisher test, with a P value of .02, the probability of what, 98 percent?
A. There's a strong association between fresh water, the level of fresh water inflow and whooping crane winter mortality. And that is demonstrated by his Fisher Exact Test.
Q. And do you agree with those conclusions?
A. Yes, I do.
Q. And in addition to the review of the work of Dr. Sass, did you conduct any original statistical work for The Aransas Project?
A. Yes. I continued with the same data set and examined it in other statistical ways to see if the relationship still held.
Q. What additional statistical analysis did you undertake at first?
A. The next step that I examined was looking at the correlation directly between the variables. The relationship is nonlinear, and --
Q. I'm sorry, let me stop you. What does "nonlinear" mean?
A. Not a straight line relationship. There is a different

type of relationship that is taking place. And so I did a transformation of the percent mortality to try to capture that non-straight-line relationship between the two variables.

Q. And is this a standard statistical technique?

A. Yes, it is.

Q. And what was the result of the analysis you did with this correlation work transformation?

A. I again, looking both at seasonal inflows and annual inflows, there is a correlation with percents, a statistically significant correlation with percent mortality.

Q. And that would be between basically the lowered inflows and the higher mortalities, that there's a statistically significant relationship?

A. Yes, that's correct.

Q. Now, did you conduct any other type of analysis?

A. Yes. I went one step further and pursued what we call a count regression model. If you think of mortality, the number of deaths is a count variable, and so there's a class of statistics called general linear models that allows us to apply regression type methodologies to count data, and so I conducted that analyses as well.

Q. And can you give me -- what's the difference between the Poisson regression and, say, the Fisher analysis? I mean --

A. Well, the Fisher analysis is a nonparametric strategy, and where we're not assuming any distributional relationship

between the variables. We're just asking whether they're related or not. And we did find that they were related.

So I went one step further to see if I could try to capture the type of relationship between the two variables. And that is where the Poisson regression or count regression comes into play.

Q. And what is the relationship that you found between the variables, under the Poisson count regression technique?

A. That the, again, the percent mortality is strongly related with inflows, lower inflows, results in higher mortality. So it further strengthened the argument.

Q. What does it mean to you, as a statistician, for data to be significantly related?

A. It means that the relationship doesn't occur by chance, that there is some mechanism that is occurring between the two variables.

Q. And in terms of proof of causation, as a statistician, if you do a statistical analysis, do you consider that to be proof of causation of a causal relationship?

A. As a statistician, we're very cautious about causation, and so we really want to be looking at a scientific relationship. And the statistical evidence can support causation if there's a scientific argument for that causation. And so as a statistician alone, I would not come in and say that there was a causal relationship. But if it's, if the

statistical evidence supports a biological explanation, then causality is a reasonable step.

Q. So, for example, if you assume that a scientific explanation exists between the relationship of inflows and whooping crane mortality, would the analysis that you conducted support a finding of a causal relationship?

A. Yes, it does.

MR. BLACKBURN: Thank you. No further questions, Your Honor.

THE COURT: Thank you.

(PAUSE.)

(Counsel conferring off the record.)

CROSS-EXAMINATION

BY MR. TAYLOR:

Q. Good afternoon, Dr. Ensor.

A. Hi. How are you doing?

Q. Good. Thank you. I just want to be clear, you're not offering any opinions in this case that any whooping cranes actually died during any period of time. Isn't that right?

THE COURT: I didn't get that.

MR. TAYLOR: Sure.

THE WITNESS: I don't get it either.

BY MR. TAYLOR:

Q. You talked about statistics, but I want to take a step back and just get an understanding of what you're --

THE COURT: What she correlated is statistically the fresh water intake or the inflows versus the crane mortality.

MR. TAYLOR: Correct. As I --

THE COURT: Is that right?

THE WITNESS: Yes.

THE COURT: And found a statistical correlation between the two.

THE WITNESS: That is correct.

THE COURT: And that it supports causation here.

THE WITNESS: Yes. I -- yes, in conjunction with the biological.

BY MR. TAYLOR:

Q. Great. Let me ask you some questions about that.

A. Okay.

Q. Doesn't a statistical analysis depend upon the data that is provided to you?

A. Certainly the data does, is required for the analysis, yes.

Q. And isn't it true that it's --

THE COURT: So the whole deal is if she got the wrong mortality rate, her data is out the window.

MR. TAYLOR: Got it.

THE COURT: So that's where we are.

MR. TAYLOR: I will save some time and move on.

THE COURT: Thank you.

MR. TAYLOR: All right. Let's --

THE COURT: I bet she knew that, too.

THE WITNESS: Well, within, I mean, it could be wrong within a certain -- the mortality doesn't have to be perfect, I guess.

MR. TAYLOR: Okay.

THE COURT: Well, they're saying 4 versus 23.

THE WITNESS: 4 versus 23?

THE COURT: That's statistically important.

THE WITNESS: That might make a bit of a difference.

BY MR. TAYLOR:

Q. That might make a bit of a difference, if the mortality --

THE COURT: It does. Go on.

MR. TAYLOR: Okay. All right. Let's look at --

THE COURT: This is the beauty of a bench trial.

MR. TAYLOR: I appreciate it. You can just move it along. I appreciate that.

BY MR. TAYLOR:

Q. Let's look at this chart. We've got on the screen a chart that was provided by you in connection with your work in this case. Isn't this --

MR. BLACKBURN: Wait, excuse me. Go ahead and offer it.

MR. TAYLOR: Well, I'm going to, she's got to -- okay, I'll offer Defendants' Exhibit 300 --

THE COURT: This is not admitted.

MR. TAYLOR: I was going to prove it up with her. It's her, it's her --

THE COURT: Well, do you know how we do that? Like this.

MR. TAYLOR: Okay.

BY MR. TAYLOR:

Q. Dr. Ensor, is this one of the graphs --

THE COURT: Do you see it on your screen?

THE WITNESS: Yes, I do. Yes.

BY MR. TAYLOR:

Q. -- that you prepared in connection with your regression analysis in this case?

A. This isn't part of my formal report, but I did a series of analyses, and I presented -- I provided everything, most of everything that I did for you, to you, and this is part of that, yes.

Q. Okay.

MR. TAYLOR: I'll offer Defendants' Exhibit 376 into evidence.

THE COURT: Any objection?

MR. WAITES: No objection.

THE COURT: Defendants' Exhibit 376 is admitted.

MR. TAYLOR: Let's go ahead and publish that.

BY MR. TAYLOR:

Q. And what I wanted to focus on is this graph up in the left-hand corner that says, "Residuals versus Fitted." Do you see that?

A. Yes, I do.

Q. And isn't this a plot of the residuals versus the fitted data that you did in connection with your Poisson regression analysis?

A. Um --

THE COURT: Okay, wait. I never liked this course in college. So I need to know more about residuals and fitteds before we even get to the end. Okay?

MR. TAYLOR: Okay, thank you. I was going to --

THE COURT: Can you explain that to me?

THE WITNESS: Yes. So there's a basic regression --

THE COURT: Not that I don't respect it. It's just too, too much for my pitiful brain.

THE WITNESS: So let's just, let's just step away from this particular problem for a second and just think abstractly. So I basically, I have two variables. And I'm trying to understand whether one variable is related to the other. And so how I might approach that is through what we call regression, where I fit the, maybe just a basic line of best fit through the data, and then I look at the deviations from that line of best fit to my actual observations. So we have a fitted line, and then we have deviations from that

fitted line. The deviation is what we refer to as the residuals. So how well on average does that line capture each individual observation.

We absolutely do not expect it to capture it perfectly. If it captured it perfectly, we would not need statistics and we could just do basic mathematics. But the question is, can we quantify how well it captures. And so the residuals are the deviation from the line of best fit.

THE COURT: Like a standard deviation?

THE WITNESS: No, it's the -- it's, if you think of two variables that vary, and so you just think of plotting those.

THE COURT: On one graph?

THE WITNESS: On one graph, so one's on, one variable is on the X axis. So if we took flow on the X axis, and we took, on the horizontal axis, and we took percent mortality on the vertical axis, and then we just asked what was the relationship between those two variables, and we try to fit a curve through those.

THE COURT: Okay.

THE WITNESS: And then we're just looking at the deviations from the curve, that is what the residuals are.

THE COURT: Thank you.

BY MR. TAYLOR:

Q. And I want to talk to you about the curve and the

deviations from the curve. So on this chart here, the red line that we see going down with a little spike towards the end and back up, doesn't that represent the predicted average mortality based on the level of fresh water inflows that you looked at?
A. Well, it's not exactly predicted average mortality. Right? Because you don't have negative mortality. So it's a, it's a standardization of that.
Q. Okay. This is a standardization, if you take the level of inflows for a particular year, where you would expect to find the average mortality for that year. Correct?
A. That isn't quite what this represents.
Q. Well, let me ask it this way. Doesn't the red line represent the predicted average mortality, based on the level of fresh water inflows for a year?
A. So, so it cannot represent -- it's a perturbation of that. Because if you -- let's say for example you go to the predicted value of 1, so that's where the X axis has a 1, then, you know, what is your Y axis in that case?
Q. Let me ask it this way. These circles, the plots are the deviation, the difference between what actually happened that year and what the model projected average mortality for that year. Correct?
A. Standardized.
Q. Standardized, correct.
A. Yes. Yes.

Q. Okay. So now we're on the same page. And for your analysis, you used 22 years of inflow and mortality data. Correct?
A. Yes.
Q. Okay. And the point, this 21 up on the top, if we can highlight that, that 21 up there, that represents the 21st year in your 22 years of data. Correct?
A. That is correct.
Q. And that 21 represents the mortality data for the winter of 2008 and 2009. Correct?
A. Well, it's the mortality and the inflow data for that year. It represents that year of data.
Q. Correct. So the 21 represents the year 2008 and 2009. Correct?
A. Yes.
Q. Okay. Now, based on the level of inflows for 2008 and 2009, your statistical regression analysis would not have predicted 23 mortalities that year. Correct?
A. Yes. It does not predict 23 mortalities.
Q. Okay. And you can't tell us, based on the regression analysis that you did, what level of mortalities that this, the red line down below the 21 point represents. Correct?
A. I don't understand your question.
Q. Okay. 21 represents the mortality or the inflow and mortality data for the winter of 2008 and 2009. Correct?

A. No, that doesn't -- it represents the information from that year.
Q. Right, the information for that year.
A. This is not a plot of the actual mortality. It would look much different.
Q. Right.
A. So the purpose of this plot is to understand if there were points that were outliers, and the 21st year is certainly an outlier in relation to the other variables that are, or other years of data.
Q. Let me ask it this way. Based on the level of inflows for 2008 and 2009, wouldn't your statistical analysis have predicted mortalities lower than 23?
A. Yes, it does predict mortalities lower than 23.
Q. Okay. Now, let's assume hypothetically that a statistical, a statistically significant correlation exists between inflows and mortality, because that's your opinion in this case, right?
A. It's my opinion, or --
Q. Now, don't you agree that if there's not a, if there's not biological support for that position, your statistical analysis cannot, by itself, establish causation between inflows and whooping crane mortality. Correct?
MR. BLACKBURN: I'm sorry, I'm not sure I understood the question.

BY MR. TAYLOR:
Q. Okay, let me ask it -- you agree that if there's not a biological, if there's not a biological support for a connection between inflows and mortality, statistics by itself does not support causation between those two variables.
A. You know, that's probably actually not correct. Statistics can support causation.
Q. Let me --
A. But --
Q. Okay, go ahead.
A. But I, as a statistician, work in conjunction with other scientists who can explain causal relationships. I would not try to explain the causal relationship.
Q. Okay. So --
A. But it doesn't mean that the statistics isn't supporting the causal relationship.
Q. Right. And my question is, without a biological support, the statistics doesn't get you to causation. Correct?
A. I would not immediately assume causation, or make that conclusion. But it doesn't mean that, it doesn't negate causation.
Q. Right, okay.
A. If that --
MR. TAYLOR: Pass the witness.
THE COURT: Thank you. Do you have any further

questions?

MR. BLACKBURN: Just a couple, Your Honor.

THE COURT: Thank you.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Dr. Ensor, were you here for Dr. Sass' testimony?

A. Yes, I was.

Q. Did, to your mind, did Dr. Sass offer a biological basis to support the causal relationship between inflows and mortality?

A. Yes, I believe that he did, just a -- I'm not a biologist, but I felt that he -- I would be --

Q. Is that the type of information you look for to pair a statistical analysis with to make causal findings?

A. Yes, that is.

MR. BLACKBURN: Thank you. No further questions.

THE COURT: Thank you.

MR. TAYLOR: Nothing further, Your Honor.

THE COURT: Thank you, ma'am. You're excused.

THE WITNESS: Thank you.

THE COURT: Would you call your next witness?

MR. BLACKBURN: Mr. Mundy will call the next witness.

MR. MUNDY: We call Dr. Felipe Chavez-Ramirez, Your Honor.

THE COURT: Thank you, Dr. Ensor.

THE WITNESS: Thank you.

FELIPE CHAVEZ-RAMIREZ, PLAINTIFF'S WITNESS NO. 4, SWORN

DIRECT EXAMINATION

BY MR. MUNDY:

Q. Good afternoon, Dr. Chavez. How are you today?

A. I'm good, sir.

Q. Would you please introduce yourself to the Judge?

A. My name is Felipe Chavez-Ramirez.

Q. And how are you employed, sir?

A. I work for the Gulf Coast Bird Observatory in Lake Jackson, Texas.

Q. All right. And Dr. Chavez --

THE COURT: What is that?

THE WITNESS: I'm sorry?

THE COURT: What is that?

THE WITNESS: The Gulf Coast Bird Observatory is a nonprofit conservation organization dedicated to the protection of migratory bird habitat along the Gulf Coast of Mexico.

BY MR. MUNDY:

Q. The Gulf Coast of the United States and Mexico?

A. I'm sorry, the Gulf of Mexico coast, in the U.S., Mexico and --

THE COURT: Where is that located, again?

THE WITNESS: Lake Jackson, Texas.

THE COURT: Thank you.

BY MR. MUNDY:

Q. And you are currently also a member of the U.S.-Canadian Whooping Crane Recovery Team, one of the five U.S. representatives?

A. That's correct.

Q. How long have you been on the U.S.-Canadian Whooping Crane Recovery Team?

A. I believe it was 2004.

Q. And before you took the position with the Gulf Coast Bird Observatory, where were you employed?

A. I was with an organization currently called The Crane Trust, but when I was there, it was called the Platte River Whooping Crane Maintenance Trust. Sorry. That's a long name.

Q. And what years were you with what we will now call The Crane Trust, by its current name?

A. 2002 through 2010.

Q. And so for those approximately eight years, give us just a very short synopsis of your positions and duties.

A. My first position there was avian ecologist. My role was to conduct research on cranes and other migratory birds that used the Platte River. So it was both sandhill cranes and whooping cranes.

In 2003, I believe, I became the Executive Director, although it was kind of a mixed position. I was, in a sense the role was a 50 percent administration and 50 percent

maintaining the research supervision that I was doing before.

THE COURT: I meant to ask another witness, but I'm going to ask you, how long does it take the cranes to migrate from Saskatchewan to Aransas Wildlife Refuge.

THE WITNESS: Oh, it can take between five to ten days.

THE COURT: That quickly?

THE WITNESS: Yes, ma'am.

BY MR. MUNDY:

Q. And explain, if you would, just in --

THE COURT: Thank you.

BY MR. MUNDY:

Q. -- for her, the honor, the Court, the significance of the Platte River or a particular section of the Platte River with respect to whooping cranes and sandhill cranes.

A. Well, the Platte River is one of the sites considered a critical habitat, has been designated as critical habitat for whooping cranes. As a matter of fact, the reason The Crane Trust exists is because of that, the importance of the Platte River for whooping cranes.

It's absolutely critical for sandhill cranes, because sandhill cranes that winter in Mexico, and anywhere from between Louisiana, Texas, New Mexico and Arizona, all those birds end up on the Platte River about a 90-mile stretch, and they spend between two to four weeks, each bird, doing nothing

but acquiring food resources --

THE COURT: So is it called a fly way, or what is it?

THE WITNESS: It's the staging area for sandhill cranes.

THE COURT: Okay.

THE WITNESS: It's a stopover for whooping cranes, because they only use it as a, generally as an overnight roost. The sandhill cranes, on the other hand --

THE COURT: They spend a lot of time there.

THE WITNESS: -- utilize it to acquire fat that they use later on for breeding in the Arctic and high latitudes, where they're still very cold.

THE COURT: Thank you.

BY MR. MUNDY:

Q. How far do whooping cranes typically fly during a day of migration from the point they lift off till they set down and rest again during their migration from north to south?

A. Well, it's quite variable, but I think the average is between 200 and 400 miles.

Q. Okay. And the Platte River would be kind of the crane equivalent of pulling over at a Stuckey or a Buck-ee's, where you pull in, get a little food and take a break, get out, walk around?

A. For sandhill cranes -- or for whooping cranes?

Q. For whooping --

A. Yes, that's correct.
Q. -- or sandhill cranes generally.
THE COURT: Sandhills, it's more like a resort, and they're staying there a while.
THE WITNESS: Yes.
MR. MUNDY: Good point.
THE WITNESS: More like a buffet table for those guys.
BY MR. MUNDY:
Q. Yeah, but the whooping cranes also use the Platte River, that particular stretch of the Platte River?
A. Yes, they do.
Q. Okay. And when you were with The Crane Trust, what is now known as the --
THE COURT: Sorry?
MR. FERNANDES: Yeah, if I may, is there any way the witness can move the mike a little bit closer?
THE COURT: No, don't touch the microphone.
MR. FERNANDES: Sorry. Why don't you try leaning in like this, with your arm on the --
THE WITNESS: Okay.
THE COURT: That's it.
THE WITNESS: How about this?
THE COURT: Perfect. Even better.
THE WITNESS: Okay.

THE COURT: Thank you.
BY MR. MUNDY:
Q. And you're a little soft spoken. Keep your voice up, if you will.
A. Yes, sir.
THE COURT: The reason we don't touch the microphones anywhere is it goes right in Ms. Gano's ear, and she's going to have a Worker's Comp deafness claim soon.
BY MR. MUNDY:
Q. And I think earlier today the Judge asked about people banding birds. You're one of the people that actually is out in the marsh and the mud and up in Canada actually banding whooping cranes?
A. That's correct.
Q. Have you ever testified in a trial like this before?
A. No, sir.
Q. Are you a little bit nervous?
A. I am.
Q. All right. It's okay. And I think just -- you have a little souvenir from banding whooping cranes last week, don't you?
A. I have a little scratch on my hand, yes.
Q. Is that from where they bite you or try?
A. Well, it was actually the --
Q. Claws?

A. -- the claws.
Q. Okay. But as recently as last week, you were out banding whooping cranes?
A. That's correct.
Q. All right. The, for the time you were at The Crane Trust, you said 2002 to 2008, by the time you left, what was your position with The Crane Trust?
A. I was Director of Science.
Q. Okay. And explain, in just very general terms, how The Crane Trust was formed, what its purpose was.
A. Back in, it must have been the mid '70s -- the trust was established in 1978. The reason it was established, there was a settlement to a litigation where the State of Nebraska, the National Wildlife Federation and several other conservation groups were contesting the building of dams in Idaho primarily. I'm sorry, not Idaho, Wyoming. So through the process of -- and I don't know the whole process that went along, but the settlement was that the project could go ahead, if they established a fund to protect and study the importance of the Platte River to cranes and other migratory birds technically.
THE COURT: Can you hear him all right?
MR. FERNANDES: I can, Your Honor.
BY MR. MUNDY:
Q. And so the ultimate outcome was to protect the most critical and important habitat along the Platte River for the

sandhills and whooping cranes?
A. That's right. The trust spent a lot of the early years by acquiring land to protect adjacent to the Platte River for the use of both species of cranes.
Q. Where did you work before The Crane Trust?
A. I was with the World Wildlife Fund.
Q. And how long were you there?
A. I was there between 1999 and 2001.
Q. And what were your responsibilities?
A. I was the coordinator for the Chihuahuan Desert Ecoregion Program.
Q. And I believe that's an area where you grew up?
A. That's right. And that's one of the reasons I took that position. It's -- I'm originally from Chihuahua City, Chihuahua, the core of the Chihuahuan Desert Ecoregion, and I saw it as an opportunity to try to do some conservation work back in the general area where I was originally from.
THE COURT: Where was that located again?
THE WITNESS: The Chihuahuan Desert Ecoregion Program covers eight states in Mexico, northern Mexico, plus West Texas, the TransPecos region, southern New Mexico, and southeastern Arizona. So it's a very huge area.
THE COURT: Big.
THE WITNESS: Yes, ma'am.
BY MR. MUNDY:

Q. What type of activities were you engaged in there? What conservation efforts?
A. Well, we did several research projects, but -- and tried to establish several reserves, tried to promote the development of conservation groups at the local scale, which are lacking, particularly in the northern Mexico portion. We helped establish several reserves for protection of endemic species of prairie dogs, cacti, and then some herps, and did a lot of work with water management issue, watersheds and river, riparian corridors within the region.
Q. All right.
MR. MUNDY: And Your Honor, for the record, Defendants have offered Dr. Chavez's report with attached CV, bibliography, supporting materials, as Defendants' Exhibit 118, which is already in evidence, in case you need it for reference. And also, since he's been the subject of the Daubert challenge, I would ask the Court to take judicial notice of the Plaintiff's response to the Daubert motion and the materials contained there --
THE COURT: I don't need to. I mean, anything that's in the Court's file, I've got.
BY MR. MUNDY:
Q. And I'm going to continue to go through, because you've been challenged by the Defendants, I'm going to go through a little more detail of some of your background, field

experience, research experience, publications, and then also --

THE COURT: How do you -- I wanted to ask, how do you band a whooping crane? What kind of -- I was in a banding thing one time, we just did migrating birds off of Virginia, and had big nets set up --

THE WITNESS: Yes, ma'am.

THE COURT: -- with the Audubon Society. What, how do you do it with cranes?

THE WITNESS: Well, we have two methods. One is for, that we use here in Texas, to trap adult white birds, which is basically leg snares.

THE COURT: A what?

THE WITNESS: Leg snares.

THE COURT: Okay.

THE WITNESS: What we do is we set these loops of soft cord on the ground and try to entice the birds to put their legs in there, and then we have a trigger mechanism to close those loops --

THE COURT: Okay.

THE WITNESS: -- on their leg, and then we run like mad, grab them, and put the tags and radios as quick as we can. In Canada, however, it's a completely different scheme. It's totally unaccessible, so we actually have to go in by helicopter, locate -- and in Canada, we're trying to trap chicks, the young, right before they learn how to fly. So

they're flightless for about 60 days of age. They're still mostly grounded. So we, once we locate them via helicopter, we, they put us close to the ground, and we basically chase them down --

THE COURT: Thank you.

THE WITNESS: -- until we can capture them.

MR. MUNDY: We actually have some video that he took just last week, Your Honor. He was at the refuge banding or attempting to band whooping cranes, and he over the weekend gave us some short videos of that, which --

THE COURT: That's not been admitted?

MR. MUNDY: Has not, Your Honor.

MR. FERNANDES: And we object to that. We just got that Saturday, late Saturday night, long after the deadline to produce documents and response -- the experts are relying upon.

THE COURT: I understand that, but apparently it's supplemental, because the birds just got here.

MR. FERNANDES: The birds have been here for October -- that was made a week ago. We got it at 9:45 Saturday night.

MR. MUNDY: If I might ask the witness a few questions about this.

BY MR. MUNDY:

Q. Last week you came down to the refuge for banding, and that was in no way related to this case or litigation or your

expert activities? It was your just normal --
A. That's right. As a matter of fact, I would be trapping right now if I wasn't here.
Q. Okay. So we're taking you away from your regular job in the field?
A. That's correct.
Q. But those, that videotaping is part of the normal scientific methods and processes you do with observing the birds, recording what you're doing in the field? If you weren't in any way involved in this case, you would be doing that?
A. The reason we recorded this year, because we, we're having a few, we want to make sure we understand how the traps react. So being able to video the behavior of the birds, because once we're, once we trap a crane -- and if Your Honor has been trapping, it's pretty exciting. I mean, the adrenaline rush is pretty quick, and we have to get done as quick as possible. Nobody can remember what happened, how it happened. Just that we got the bird, it's banded, and it's gone.
Q. My question --
A. The video is a way to keep some sort of record of what happened, because nobody else -- it's really hard to do.
Q. My question is, that was done not for this case or your involvement in this case in any way. It's your just usual professional activity?

A. Oh, that's correct. That's right. That's right. It has nothing to do with the case.
Q. And it happened just last week?
A. Yes.
Q. And that's not just you doing it, that's a coordinated team effort, where members of the team have to coordinate schedules about when they're going to conduct the activity?
A. That's right. The trapping team consists of myself, a member of the International Crane Foundation from Wisconsin, a member from the USGS Geological Survey in North Dakota, and somebody from The Crane Trust in Nebraska. So yes, it takes quite a bit of coordination to get everybody at the same place at the same time.
Q. And you first made those videos available to members of the -- the lawyers, me, Mr. Blackburn, Saturday, first time you ever gave them to us or we knew about those?
A. That's correct.
Q. Okay.
MR. MUNDY: And we gave them the same day or that evening to the opposing counsel, Your Honor, so I believe there's good cause, and no undue prejudice to the Defendants, and I would move for the admission of those videos.
THE COURT: Mr. Fernandes?
MR. FERNANDES: I just, I have no idea what they're offering this for, to support an opinion in this case, or to

illustrate a --

THE COURT: I guess because I just want to see it.

MR. FERNANDES: Yeah, that's my point. I want to see it, too. But if I could --

THE COURT: Well, why don't we just look at it, and if it's not relevant, I'm not going to consider it.

MR. FERNANDES: Yeah.

THE COURT: It's probably not relevant for anything. I'm just curious.

MR. FERNANDES: Yeah. I just have no idea why they're offering it.

THE COURT: I agree with you. I'd just like to see it.

MR. MUNDY: This is Plaintiff's Exhibits 365 through 370, Your Honor. It's -- each one is a few minutes, we picked out just like 30 or 60-second excerpts from a few.

THE COURT: 365 through what?

MR. MUNDY: 370.

THE COURT: It's admitted. And just to look at, see if -- it may not be relevant for anything.

MR. MUNDY: It just shows the birds, you'll see adults and juveniles, and in fact shows them trying to trap or snare one. Could we turn the lights down a little bit?

THE COURT: Yes.

MR. MUNDY: Thank you.

THE WITNESS: Your Honor, this is the hole where the juvenile bird is in. That's where we wanted him to step, except we're now trying to trap adult birds, so white birds.

MR. MUNDY: Explain --

THE COURT: So the ropes and the, are the cords in the hole?

THE WITNESS: The cord is on the edge of that depression that you see there.

THE COURT: Okay.

THE WITNESS: So our expectation is once we have a white bird step in there with one leg and one leg only, we'll trigger the closing mechanism on it.

MR. MUNDY: Okay. And if you would, explain the difference of the all white bird versus the ones with the brown heads for the record.

THE COURT: Well, those are juveniles.

MR. MUNDY: Okay.

THE COURT: I got it.

MR. MUNDY: All right.

THE COURT: I've been sitting here with everybody else.

MR. MUNDY: Right.

BY MR. MUNDY:

Q. And then why did you not try and trigger the snare while the juvenile is, has its foot in the hole?

A. Because we've been, we can get chicks in Canada fairly easily, relative to the trapping mechanisms here in Texas, and so we want to get a better sample of adult white birds, because when we -- one of the big objectives of this project is trying to understand mortality during migration. And that, we don't want to have, you know, 90 percent chicks and very few adult birds. We want to focus on getting white birds in Texas and doing the chick tracking in Canada.

Q. All right. In a perfect world, if you could band as many birds as was your goal this year, how many birds would you attempt to band?

A. This year, we would like to trap 12 white birds.

Q. Okay. And --

A. Or this winter, I should say.

UNIDENTIFIED SPEAKER: Should we move up?

MR. MUNDY: Yes.

BY MR. MUNDY:

Q. Let's go ahead, let's go to the next excerpt, and explain where these are being taken, you know, what type of habitat on the refuge.

A. Well, one of the other videos has a very nice wide angle shot of where we're at.

Q. Let's go ahead and move to the next --

UNIDENTIFIED SPEAKER: I think that was 366 --

THE WITNESS: Basically what we've done is we've --

this year is a fairly, what we call a dry year.
BY MR. MUNDY:
Q. Okay. There it is.
A. There it is. So the places we've set up our traps, it is in places, in watering areas where we expect cranes to come drink water, especially this year, because it's fairly dry and the salinities are fairly high. So we see the cranes will, should be coming in here shortly. There they go.
Q. There they are. So --
A. So these are basically the areas where whooping cranes would come to drink water from -- these are fresh water upland grassland, oak savanna type environments.
Q. This is on the interior of the refuge?
A. This is inside the refuge, that's correct.
Q. Okay. And that habitat we're seeing here, these -- to me it looks like an old ranch stock tank, for lack of a technical term. Where do these come from?
A. The refuge was originally a cattle ranch. And most of these ponds that we call ponds now were stock tanks for cattle in the old days. That's correct.
Q. And the, around the perimeter, that's -- what type of habitat is that?
A. There's a lot of cordgrass in this picture, basically a grassland surrounds this particular hole or pond.
Q. What's also known as coastal prairie?

A. Yes, that's correct.
Q. And you were in the room, heard Dr. Archibald's testimony today earlier?
A. Yes, I was.
Q. And he was explaining how, in historic times, these were really tall grass prairie birds?
A. That's right. In the breeding grounds, when he was talking about it, yes.
Q. And explain, if you will, just very briefly, in what role wildfire plays in the natural ecosystem of prairies?
A. Well, fires -- prairies are basically evolved with fire. I mean, in most parts of the world, the reason we have grasslands is because of regular fires or some other natural process like droughts and things of that sort. So grasslands that are not burned on a regular basis become encroached with wooded vegetation, and that changes the whole composition of the environment from a grassland to a savanna, and eventually a woodland in many cases. Texas is a perfect example of that. I mean, wooded areas that did not exist before are now basically woodlands --
Q. So --
A. -- that used to be grasslands.
Q. So the refuge personnel doing --
THE COURT: Ms. Snapka?
THE WITNESS: I'm sorry?

MS. SNAPKA: Thank you.

THE COURT: Go ahead.

BY MR. MUNDY:

Q. So the refuge personnel conducting controlled burns on locational basis around the refuge is just mimicking the natural behavior of a native prairie?

A. I think, yes, that's one of the objectives of burning is to try to keep the woody vegetation out of the grasslands and open areas. If you're trying to manage, if you were going to manage for whooping cranes, and we did this at the trust in Nebraska, you want to keep the vegetation open. They want wide views, the way they like their habitats, you know, a place where -- and the priority objectives of the refuge is to try to keep that woody vegetation out --

Q. Okay.

A. -- of some of these open grasslands.

Q. And besides whooping cranes, other birds utilize burned areas as part of their natural foraging behaviors?

A. Yeah.

Q. Certain woodpeckers, black-capped vireos, as examples.

A. Pretty much, there's a lot of species that are attracted to burned areas, indeed. There are many bird species, things of that sort.

Q. All right. If you can --

MR. MUNDY: Thank you, Mr. Waites.

MR. WAITES: Did you want to show one more?

MR. MUNDY: You have one more clip? Okay.

BY MR. MUNDY:

Q. What are the birds doing here, sir?

A. They're --

THE COURT: They're drinking, I bet.

MR. MUNDY: And Your Honor, it seems obvious, but it's been a contested issue by the Defendants. That's why I ask.

THE COURT: Oh, you think they're not drinking?

MR. FERNANDES: We have not contested that they're drinking. The only thing we've contested is the need to drink water at certain salinity levels in the salt marsh, because every time they drink in a salt marsh, they're drinking water that, by definition, is not fresh.

THE COURT: Thank you.

MR. MUNDY: The, the -- if we can, let's go back a little bit more to your experience and training, sir. Thank you, Mr. Waites. The --

THE COURT: That's it?

MR. WAITES: Would you like to see some more?

THE COURT: No, but I agree with Mr. Fernandes, it's not relevant to anything, but I really enjoyed seeing it. So we'll leave it in. But I won't be considering it, except it was educational for me.

BY MR. MUNDY:
Q. You have a Ph.D. Correct?
A. That's correct.
Q. What is your -- when did you receive your Ph.D., what was the subject of your Ph.D. study and thesis?
A. My Ph.D., I got a Ph.D. in 1996, in wildlife ecology at Texas A&M University.
THE COURT: On what ecology?
THE WITNESS: Wildlife ecology.
THE COURT: Thank you.
THE WITNESS: The subject of my dissertation was Whooping Crane Habitat Use of Foraging and Energetics in the Wintering Grounds.
THE COURT: Foraging and what?
THE WITNESS: Habitat Use, Foraging and Energetics of Wintering Whooping Cranes, if I remember the title correctly.
BY MR. MUNDY:
Q. In fact, it's part of exhibit, Defendant Exhibit 118, Your Honor.
MR. MUNDY: If you could turn on the ELMO, Mr. Waites.
BY MR. MUNDY:
Q. Okay. We'll just walk through the abstract of it at this time and let you explain some of the concepts and terminologies. We'll be discussing them in much more detail in

your testimony. But give us kind of the 101 basic intro to your Ph.D. thesis, if you will. You said it's 1996.

A. Yes, sir.

Q. Give me just a moment. Okay. This is the cover page, Food Availability, Foraging Ecology and Energetics of Whooping Cranes. Food availability we understand. Explain what foraging ecology is, this concept that you're discussing in your dissertation?

A. Foraging ecology is basically the study of how an animal acquires food, its behaviors, his movements within the landscape, things of that nature.

Q. And what are energetics?

A. Energetics is basically the amount of energy consumed versus amount of energy expended. When you eat, you acquire energy. When you move around or exercise or run, you expend energy. So basically I was trying to look at an energetic budget and see what cranes eat, how that equated to their energy expenditure, based on their activities that they conducted in their wintering grounds.

Q. How it relates to, say, their basic life activities, maintaining, just survival, reproduction, migration, so forth?

A. Well, at that time I wasn't -- I was only considering their wintering survival.

Q. Okay.

A. I wasn't considering anything else.

Q. All right. And among the Ph.D. panel, the chair of the committee that awarded your Ph.D. to you was headed by whom?
A. Dr. Doug Slack.
Q. And signed off with a personal signature approving it as to the style and approving its content. Correct?
A. That's correct.
Q. The, if you will, let's walk the Court through just the -- again, explain basic terminologies of concept. "I investigated abundance of principal food items, foraging behavior, habitat use and patterns." Explain that in everyday language, if you will, what you were looking for --
A. Sure.
Q. -- out in the field. And when did you do the actual field work that composed this work?
A. The field work was conducted in the winters of '92-'93, and '93-'94. The first portion there, the abundance of principal food items, I was trying to basically sample in the salt marsh the abundance of what the principal food items in the diet of whooping cranes were, based on my observations. So I was basically measuring, I would set out traps for crabs, I would set out sampling plots for wolfberry and snails, and I would do benthic -- I would look at the sediment in the bay edges and some of the ponds by collecting about eight inches of sediment and sifting through it to look at availability of clams and other potential invertebrates that there are. So the

abundance part was basically sampling the environment for food items that could be present there.

Q. All right. Now, using nonscientific terms from my end, would you characterize '92-'93 as a good year or a bad year, and how would you characterize '93-'94, good year, bad year as far as food availability?

A. Sure. Based on my sampling, crabs were very abundant the first winter, '92-'93, less so in '93-'94. So I ultimately ended up categorizing '92-'93 as a good year because of the abundance of foods and the lack of mortality in the winter, and the second year I considered less good, as far as abundance of food resources, and because there was mortality, significant mortality of cranes that winter as well.

Q. All right. And --

THE COURT: What was the mortality rate?

THE WITNESS: I'm sorry?

THE COURT: Mortality of that second winter?

THE WITNESS: I think it was 8 percent that winter, if I remember correctly.

THE COURT: 8 percent in --

THE WITNESS: There were seven birds, seven or eight birds died that winter, versus zero that previous winter.

THE COURT: Thank you.

MR. MUNDY: Your Honor, Plaintiffs move for admission of Plaintiff's Exhibit 45, which has not been previously

admitted. It's been shown to opposing counsel.

MR. FERNANDES: I have no objection, Your Honor.

MR. WILLIS: None.

THE COURT: Plaintiff's 45 is admitted.

BY MR. MUNDY:

Q. A lot of us frequently visit the Aransas Refuge, but just to lay out very clearly what you're studying in your study area, the Aransas Refuge, where we drive the tour loop, or frequently take the boat tours up the Intracoastal is over here, but you also mentioned Matagorda Island. Explain, explain the difference in the two with respect to just actual boundaries, or how you describe it in your study.

A. Right. Well, I consider both of them as my study area. I spent, I would normally spend a week on Aransas and a week on Matagorda and alternate for all, all of my data gathering, whether it was food sampling or behavior, or the observations of cranes foraging or habitat use patterns.

Q. But you did study on both sides to see if there was any noticeable difference between the two geographic areas?

A. That's right. Part of my comparison was to look at, see if there were any differences in all the objectives that are presented in the abstract between the two.

Q. Did you notice any real substantial differences between either side --

A. Not that I can recall.

Q. -- major differences?
A. There was a few things regarding behaviors. I think time-activity budgets were a little different in regards to alert and rest and a few things like that. But not that I could say.
Q. Nothing big?
A. Very -- right.
Q. Okay. Again, we'll spend a little time, if you would explain for Her Honor the utilization, what you mean by utilization of salt marsh habitats, percentage of those two percentages compared to uplands and bays. Explain what you studied, what you mean by utilization --
A. Right.
Q. -- and the differences in those habitat uses.
A. Sure. Well, if you go back to the very first part there, the habitat use patterns is what that refers to. And basically what I did here was try to look at where the cranes were spending their time. And I did this with, by flying on the aerial surveys that Aransas was conducting. So I would fly every week and determine what kind of habitat the cranes, each crane was physically located in and use that to determine what the general pattern of habitat use was throughout the area.
So when it says, "Whooping cranes utilize salt marsh habitats predominantly, 87 and 86," that means that 87 percent of the cranes that I observed in the surveys were in what we

call the salt marsh habitats. 8.8 were in uplands, and 3.9 were in bays. So basically those are the proportion of cranes I observed during the winter in those different habitats.

Q. Noting the observation location by habitat type?

A. That's right.

Q. All right. Now, explain the next term, "Within the salt marsh, proportional use of different mesohabitats varied among months within a winter season in between winters." Explain the concepts there of what you studied and what you found.

A. Well, if we looked at a picture of the area from the air, you could see that one part of it is open water, which is the bay. Next to that would be the salt marsh, which is composed of vegetative flats, with plants tolerant to salt water, obviously. Then open portions of open water of different sizes, and channels that connect to the bay or that connect to open water bodies. And then if you move further inland from the salt marsh, you start getting into mud flats, sand flats, and eventually you end up with upland vegetation like we saw earlier, grasslands, oak scrubs, et cetera. So within each one of these -- those are what I call macrohabitats. So bay, salt marsh, upland --

Q. Micro or macro?

A. Macro, sorry.

Q. Macro, got it.

A. And within, for example, if we took a closer look at just

the salt marsh, we would see that some areas have vegetation of different species, some areas are open water. So that difference between the salt marsh is what I tried to capture with mesohabitats, whether it's open water or whether it's a vegetated flat or a mud flat or a sand flat. So I was just trying to get a, let's say a closer definition of where the bird was spending their time.

Q. All right. And you noted that there was a difference of habitat usage between the comparatively good winter versus the not-so-good winter, the two seasons you studied?

A. That's right. There were some patterns of different -- when I compiled the different surveys over months, you could see that there were periods of time when they used different habitats to different extents, more or less. More vegetation early in the winter, more open water later on, for example.

Q. And this is your own personal observations of being in the field day in and day out through those two winters?

A. The habitat use information is based primarily on the aerial surveys. But yes, my own personal notation of where every bird was standing at the time I observed them.

Q. Approximately how many days did you spend doing actual field work over those two winter seasons?

A. Well, at least six months each, each winter, so at least 300 days, if not more.

THE COURT: Almost every day during that time period?

THE WITNESS: Every day, ma'am, except for an occasion, very rare days that I was not actually in the field, yes.

BY MR. MUNDY:

Q. Explain to, if you will, what your findings from your own personal observations were about what the whooping cranes' primary food items were.

A. Well, the big ones that showed up in my, in my, during my study were blue crab and wolfberry. And there were a few others that showed up as well, but not to a very significant extent, like clams. There were some snails. There were some insects that showed up. So there was --

Q. What --

A. And I can't remember other food items right now, but there's a short list of things that I observed them eat. But the vast majority of what I observed and recorded were blue crab and wolfberry.

Q. All right. And you have a statement about an orthopteran insect. What is an orthopteran insect?

A. It's primarily crickets and grasshoppers.

Q. All right. We'll call them grasshoppers and crickets then.

A. Okay, sir.

Q. Explain which food items among those primary food items, what type of habitats they're found in. What do they

correspond to? Let's start from the bay and work our way in.
A. Well, the bays are, bays obviously have, could have crabs and clams. You know, clams are very common, they're most common in the bays than anywhere else, as far as I think. So they're there. Obviously crabs are in the bay as well. But in the salt marsh, the vegetated flats is where wolfberry exists, so that's where that would be encountered primarily.
Q. What do you mean by vegetated flat? Explain what that type of habitat is.
A. Well, do you have a picture of anything that we could use? Because --
Q. I'm sure we do.
A. If we looked at the marsh --
Q. We'll find one in a minute.
A. -- the areas of open water are basically what I'm calling the open water parts, ponds, pools. So the salt marsh is composed of a lot of vegetated areas. I mean, if you looked at it, it's like a carpet with holes in it. So that vegetated carpeted area is what's vegetation. That's what I'm calling vegetated flats.
Q. The bay, how deep are the cranes typically feeding on crabs when they're in the open water and --
THE COURT: I'm sorry?
BY MR. MUNDY:
Q. What is the average depth of water in which the cranes

feed in the open bay on the crabs?
A. The crabs, the cranes prefer fairly shallow water, for, probably for obvious reasons. But the highest I've ever seen them forage is about .8 meters.
Q. Is that about two feet?
A. About two feet maybe.
Q. What's the typical average where you see them forage for blue crab?
A. Well, they would generally prefer much shallower, I mean a foot or less is the most common thing to see them foraging in.
Q. Okay. Next, that -- when you move into the vegetative salt marsh, that's an area where we heard some about the tides. Good example there?
A. So -- yeah. So what I would call vegetated flats is the rough part of that. That's all vegetation, obviously. And then the open water is obvious. So those, that's what I refer to vegetation.
Q. Okay.
A. And the marsh is fairly simple, as far as vegetation. There's five to eight species for the most part in any particular point. And that's, but that's where the wolfberry is found primarily.
Q. All right. Then continuing on in from that vegetative area, what's the next habitat type zone inland from the salt marsh vegetation zone?

A. Well, it's the uplands. And the uplands we can subdivide in probably categories that most people are actually very familiar with. You know, there's grasslands, there's oak shrubs, roads would be a mesohabitat within an upland, fresh water ponds, just about everything, you know, you could walk on in the upland could be categorized into some form.

Q. Kind of like we saw on those videos a minute ago?

A. That's right.

Q. Okay. What type of foods did you see the cranes primarily using when they're in the upland areas?

A. That I personally observed would be legless lizards. I observed snakes, insects, particularly -- I couldn't be exactly sure, but they were orthopterans. I don't know if it was a grasshopper or a cricket, but that, in looking at feces from those areas, they do show up. But as personal observations, it would be legless lizards, snakes, insects. And I think one other thing I saw is a direct foraging event.

Q. All right. And comparatively, time-wise and volume-wise of them eating things, how much time do they spend eating and foraging in uplands typically in a good year versus out in the salt marsh or the bay?

THE COURT: What happened to the overhead document screen?

THE WITNESS: I'm sorry?

THE COURT: Ms. Cayce? Thank you.

THE WITNESS: I'm sorry, could you --

BY MR. MUNDY:

Q. I think I lost my question. But going back, this is where you did the percentage analysis of time they spent foraging by habitat, or they were found in particular habitat zones?

A. Well, I guess I need to clarify the difference.

Q. Okay.

A. When I say, these proportions that are shown here, 87, 86, 8.8, are the proportion of cranes that I observed in those habitats.

Q. When you found them, that's where you found them?

A. That's right, from the air.

Q. Okay.

A. When you look at them now from the ground, I mean most of their time is about 65 percent of the time they're actually foraging. You know, when you're actually looking at their foraging activity during the day.

THE COURT: 65 percent?

THE WITNESS: Yes, ma'am. So they spend a large portion of the day --

THE COURT: For what time period is that? I mean, when do they wake up in the morning?

THE WITNESS: Well, they start calling right, right now at this time of day, seems to me, between ten, ten minutes to 7:00 to right around 7:00 is when they start getting active

at this time of year. And then they go through, they're pretty much active until sunset. So spend about 11 hours, 11-and-a-half hours a day.

THE COURT: Thank you.

BY MR. MUNDY:

Q. I think the Judge asked a question of Mr. Archibald about approximately how many crabs will a whooping crane eat in a day. Do you --

A. What I, what I recorded during a good year, when crabs were abundant, it was between 70 and 80 crabs a day.

Q. Per bird?

A. Per bird, yes.

THE COURT: I'm sorry. How many?

THE WITNESS: 70 to 80.

BY MR. MUNDY:

Q. I'm trying to do math real fast. 70 or 80 -- 75 times 300, trying to do it in my head --

A. Don't look at me.

Q. I don't know. I'll figure it out while you're --

THE COURT: 22,500. Anybody else --

THE WITNESS: Is that the answer?

THE COURT: 22,500. I did it --

MR. MUNDY: I turned my phone off, so I can't calculate. That sounds about right.

THE WITNESS: I don't think I ever did that math.

BY MR. MUNDY:

Q. Now, explain, if you will, the work you did and you laid out in the abstract about time-activity budgets and then what you described as alert behavior, maintenance. What do you mean by those concepts?

A. Well, in order to determine the energy that a, an individual, regardless of what it is, whether it's a crane or anybody else, one of the ways to determine how much energy they spend in a day, or an hour, or a minute, whatever you want, requires you to determine what activities it does. Because different activities obviously take different amount of energy. So if you're just watching TV, obviously it would be much different than if you're out running, you know, eight-minute miles out somewhere.

So in order for me to determine -- one of the objectives of my dissertation was to determine energetics, I had to determine -- I had to do a time-activity budget. How does the crane spend its day? And in order to determine that, I had to know what behaviors I needed to quantify.

So cranes spend a lot of time foraging. They walk, they spend time in alert, they rest. They do maintenance activities, which would be like preening, scratching, you know, comfort movements. They interact with other birds, such as defending their territory or courtship. So I had to categorize all those and then spend time watching the birds and determine

how much time was spent in different activities throughout the day. And once --

Q. So you have like a field log or field notebook where you've broken down these activities, and you're literally sitting there all day just marking times in each particular category?

A. Yes. What I would do is spend 30 minutes watching a bird. And every 15 seconds record what activity it was engaged in. And then after those 30 minutes, I would move on to a different bird, and then just do that over and over and over and over and over again. Yes.

Q. Exciting life of a grad student in the field?

A. Yes, sir.

Q. Then what is meant by alert behaviors? What's the significance of alert behavior, and how does it vary by habitat zone from what you personally observed?

A. Alert behavior is basically when the crane is attentive to some external stimuli. Most of the time we equate, in a wild animal, alert behavior to searching for predators, unless it's a predator. If it's a nonpredator animal we assume alert has to do with figuring out whether there's a predator nearby or some other threat to its survival.

Q. Keeping a watch? Staying on watch or keeping a guard?

A. Right. And I don't know if you remember the videos, but all of the cranes there, when they stand with their head, their

neck straight and their head is just panning the landscape, that's alert behavior. It's very easy to distinguish from, for example, rest, when the neck is very much relaxed.

And so alert is basically an indication that something is either disturbing them or they're looking for some source of disturbance in their environment.

Q. All right. From your personal observations in the field, when the -- family units, I think we heard from Dr. Archibald, stay very close to each other, a very cohesive group. Did you personally observe that too?

A. That's correct.

Q. I mean, that's well described by many, many observers of cranes through the decades?

A. Yeah. If I'm out in the field and I see a -- in the territorial areas, if I see a crane, I can -- I have to assume that the other two, at least the pair, or the pair and chick, are somewhere in very close proximity to that individual, because that is the norm that they are very close to each other in --

Q. When you say "very close," how many feet, yards, meters? How close do they typically stay, parents to the chick?

A. Well, the chick stays close to at least one parent, very, very closely. I'd say 20 to 50 meters, you know, at most. And very quickly reacts to any potential noise or disturbance by running to at least one of the parents very quickly.

THE COURT: Okay, I've got to ask. Did you dance with the cranes like Dr. Archibald did?

THE WITNESS: No, ma'am, I haven't dealt with the captive breeding birds very much, only with the wild birds, and they don't let me get close to them like that.

BY MR. MUNDY:

Q. What did you notice about time spent in alert behavior between the different habitat zones?

A. Well, if I remember correctly, the habitat that had the highest alert behavior was uplands, compared to all the other ones. And also that alert was much, was lower in Matagorda compared to Aransas, for example.

Q. And what's the reason why there's more time spent on alert behavior in upland areas, compared to, say, the open bay at the other end of the spectrum?

A. Well, I'd have to say that it's a couple of things. One, it's, they're areas that are outside their territories, so therefore they're unknown. You know, it's not the same if you're in your house versus your neighbor's. I mean, you know exactly where everything is in yours. So when they're in their territories, they're much more comfortable. The uplands are not within the territory, so that's one.

The other issue is, when we look at Aransas or any coastal area, I suppose, the potential predators of whooping cranes, such as bobcats, are much more likely to be in the uplands than

they are in the salt marsh. The uplands in that, at least in that part of the world, have a lot of places where a bobcat could hide.

I mean, burn areas, for the most part, are not 100 percent. So it's not like you end up with a surface such as you would see on top of a table. There's patches of vegetation that did not burn, so there's very thick patches around the area that could potentially hide predators. So being in a burn, I have to consider that they're much more alert because they're looking around in case there's predators in the vicinity.

Q. What are the major predators on the wintering grounds of the whooping crane?

A. Well, it's a documentation issue. You know, I'm not sure that we, you know, we can't say 20 birds have been eaten by bobcats. We know that some of the necropsy reports show predation. And the most likely predator out there, at least based on, on the footage of cameras at these watering ponds, are bobcats, are the most common things out there.

Q. Okay.

A. Which we know bobcats can take whooping cranes, based on the experiments that they've done of reintroducing birds in Florida, where bobcats took a large proportion of cranes out there.

Q. All right. And then with respect, Mr. Fernandes raised a

question earlier about alligators as potential predators. How frequently do you believe alligators present a real predation threat to the cranes in the salt marsh?

A. In the salt marsh, very little. I mean, as much time as I've spent out there, I think I've only seen two alligators in the salt marsh during my field time. And I can guarantee you that if we walk up to one of these ponds, and the temperature is about 60 degrees, we're going to see an alligator in those ponds. So very different, very different.

Q. Very few alligators salt marsh side, but relatively common on the inland ponds?

A. That's correct.

THE COURT: What about snakes?

THE WITNESS: Snakes are common everywhere, Your Honor.

THE COURT: Fresh, salt, everything?

THE WITNESS: Yes, ma'am. There's -- well, there's -- all the poisonous snakes are out there, rattlesnakes, moccasins, copperheads.

THE COURT: I hate snakes.

THE WITNESS: Yes.

THE COURT: Are they predators for the cranes?

THE WITNESS: No, I think they're more like food.

THE COURT: Oh, really?

THE WITNESS: Oh, yeah, a crane could probably take

out a snake pretty easy, yeah.

THE COURT: Okay.

BY MR. MUNDY:

Q. So bobcats, though, your impression is probably top of the list of predator threat?

A. That would be my opinion, yes, that bobcats would be the primary predator.

Q. Okay. Coyotes also another potential?

A. They're a potential, yes, for sick birds maybe, but I don't think they could take on a healthy bird.

Q. Okay. Get my paperwork in order here for just a moment. Flipping to the back page, or second page of your abstract, walking through the general concepts here, the -- if you would explain the statement, "All behaviors, feeding" -- "During the first winter, all behaviors, feeding" -- pull this down a little bit -- "During the first winter, all behaviors, feeding, locomotion, interaction, rest, maintenance and the work differed significantly among the four habitats of the mainland. Time spent performing certain behavioral activities differed for years between given habitats. Food availability, disturbances, possible predation risks associated with different locations explain some difference." You've basically already explained this. We'll just skip that.

Explain again this terminology. It says, quote, "Based on energetic contribution to overall energy intake." Explain what

you mean by that concept before we get into what you found.
A. All right. So part of the documentation that I was trying to do, so the time-activity budget that I explained was trying to determine how much energy a bird would use during the day by knowing how much time he spends foraging, walking, interacting, resting, et cetera. That gives us an energy expenditure.

In order to determine how much energy they intake, I needed to determine how many food items they would eat in a determined amount of time. And each, obviously each food item has a particular amount of energy. So based on the number of food items that I observed them eat and the energy content of those food items, that's what that refers to.
Q. Trying to evaluate, is this grilled chicken with vegetables or is this McDonald's french fries, kind of evaluating the difference of what they're eating?
A. Well, that's one. The other one is if you eat ten crabs and one snail, obviously just by numbers, the energetic contribution is going to be very high of crabs versus snails.
Q. Okay.
A. If you had one snail and one crab, you still get more energy from a big crab versus a little snail.
Q. One crab packs a lot of punch, compared to many of the little food items?
A. That's right.
Q. And again --

THE COURT: What about the energy to -- do 70 crabs, I guess, be the food equivalent of 300 snails? Or how many?

THE WITNESS: Probably a lot more, ma'am, because snails, particularly depending on the ones that I think, based on my sampling, the most common snails found were horse snails. Horse snails are mostly shell. So they're hard, and shells --

THE COURT: So how many snails per 75 crabs would you have to forage in a day?

THE WITNESS: I don't know. Thousands.

THE COURT: Do you think?

THE WITNESS: Oh, yeah.

THE COURT: And the effort to do, pick out that many out of the shells --

THE WITNESS: Well, they -- the shell, like I said, is like -- eating a snail is like eating a rock with a sliver of beef jerky on it or something. Most of it is not going to do you any good. It's just hard shell --

THE COURT: So they eat the snails whole without picking it out?

THE WITNESS: That's right, because they're fairly small.

THE COURT: Okay.

THE WITNESS: I mean, a half an inch, an inch, something like that.

THE COURT: Including the shell.

THE WITNESS: Yes.

THE COURT: Okay.

THE WITNESS: And they eat the whole shell complete, so --

BY MR. MUNDY:

Q. And I think we'll hear in greater detail tomorrow, because we're not going to finish today obviously, but you actually did sampling collecting the fecal matter and analyzing the fecal matter collected out in the field to analyze what they found, or what they ate by volume?

A. That's correct. You know, it was to get a feel for how, how the parts of the organisms they forage on ended up on the other end of the bird.

Q. So just to make it clear, you did visual observation of them eating, recorded it, but also collected fecal matter, analyzed that data also?

A. That's correct.

Q. Okay. Then -- and again, based on the energetic contribution, what did you find was the most significant food item during most of the winter months in both winters for the cranes?

A. The energetic contribution of blue crab was by far the most important one during my two years of study out there.

Q. If blue crabs are available, will the cranes go to those preferentially over any other food?

A. That's my impression. I've seen them run to go catch a crab, as they were walking calmly somewhere else. Yes, I would think so.
Q. Pretty much first on the list if it's there?
A. Yes, that's what I think.
Q. And what's number two, if it's available?
A. That's a hard one.
Q. Okay. Crabs are number one, everything else is down?
A. Yes.
Q. I think that we got it. Again, explain some of these general concepts. Explain what you mean by, "Differential mortality between winter studies and differences in reproductive success in subsequent breeding seasons suggest energy stores obtained on the wintering grounds are of great importance in determining over winter survival and overall fitness, i.e., subsequent reproduction of the cranes."
A. Well, many birds, particularly those that breed in the arctic regions of the planet, upon their arrival -- and sandhill cranes and whooping cranes are two of the species that when they get to their breeding grounds, the breeding grounds are sometimes frozen or covered in snow. I mean, so their opportunities for feeding are basically none. So unless they have energy stored with them that they can use to survive, and in case of breeding pairs, to produce eggs, they won't be able to do so.

In the case of the whooping crane, because it spends, as I mentioned earlier, the sandhill crane, for example, spends several weeks on the Platte River. And we know that's where it acquires its food resources, its fat it eventually uses in the arctic.

Because the whooping crane, once it leaves Aransas, flies very quickly and spends very little time along the migration route and spends more time in the wintering grounds, you know, the sandhill cranes are out on the Platte River as early as February. The whooping cranes stay in Texas until late March and early April. So they're trying to store that energy in the wintering grounds, because they're not going to stop somewhere along the way like sandhills do to do that.

So this suggests that they're spending as much time acquiring as much food to store fat that they can then utilize for survival and reproduction in the breeding grounds.

THE COURT: Where do they actually mate? Here or in Canada?

THE WITNESS: Well, they start mating here, ma'am.

THE COURT: Okay.

THE WITNESS: So that, and all along the migration corridor, you generally see courtship displays as they migrate northward.

THE COURT: They don't ever accidentally lay eggs in Aransas, do they?

THE WITNESS: Not that we know of.

THE COURT: Okay.

THE WITNESS: It hasn't happened, nesting, except a captive bird they had at some point in the past.

BY MR. MUNDY:

Q. Bottom line, that concept stated in everyday language, the birds have to build up additional excess reserves for the migration and arrival on the breeding territory because food may or may not be available?

A. Yeah.

Q. And the better their reserves when they arrive there, the better their reproductive success?

A. That's right. Well, yeah, because sometimes the frozen ground stays like that for several weeks when the birds arrive.

Q. And besides, besides working at Aransas, have you also worked up on the breeding grounds in Canada?

A. Only for trapping.

THE COURT: Pardon?

THE WITNESS: Only for trapping the cranes.

BY MR. MUNDY:

Q. What did you do up --

THE COURT: For banding?

THE WITNESS: Yes, ma'am. I guess I shouldn't call it trapping, more like capturing, because we never use traps there.

BY MR. MUNDY:

Q. Okay. And just explain briefly what you did up in Canada on the breeding grounds.

A. Basically we were trying, just trying to -- we did some surveys to determine the distribution of nesting birds, the amount of chicks that had been produced, and then try to spread our capture efforts in as broader a way as we could, so we don't just collect the birds from the very same place, or adjacent to each other.

Q. Right. Now, just to fill in a little more of your history, besides the positions we've already discussed, have you had academic responsibilities as part of your professional career?

A. Yes, and I actually still do.

Q. And please explain what your academic duties and experience are.

A. Well, upon graduation from Texas A&M -- actually before I graduated from A&M, I was a lecturer. For the last about two years, while I was finishing my Ph.D., I was a lecturer of Texas A&M University. I then became assistant professor at Caesar Kleberg Wildlife Research Institute at the Texas A&M University-Kingsville.

Q. Well, maybe I'm Texas biased, but that's a very well respected institution when it comes to wildlife, biology, ecology conservation.

A. That's correct, yes. So and then upon leaving for my degree -- I'm sorry -- for the World Wildlife Fund, I actually have maintained status as a graduate faculty member or adjunct faculty member at several universities, which I currently still do. I currently have a total of, well, eight graduate students that I supervise as chair of the committees at the University of Nebraska, Hays State University, and a couple of research centers in Mexico as well.

Q. Those are Ph.D. candidates, or master's, both?

A. There's five Ph.D.s and three master's students, yes.

Q. Okay. And --

THE COURT: So you're a popular selection for committees.

THE WITNESS: Well, that's -- since I can't get out to everywhere any more, I have to get students to do the fun stuff now.

BY MR. MUNDY:

Q. But you still get to spend a little time in the field.

A. Oh, yes indeed.

Q. As far, if you would explain what these other groups and organizations are and what your involvement with them has been. Explain, we've heard about the U.S. Canadian Whooping Crane Recovery Team. Explain what the IUCN is, in particular, the crane specialist group, what your involvement with that organization is?

A. Well, the International Unit for Conservation of Nature is obviously a, it's a consortium of governments throughout the world to try to protect nature, of course. And within those, that group, they try to bring together experts in different fields for different groups of animals. And there's heron groups, and there's horn-bill groups and all sorts, rhinos, elephants, whatever. But so this crane specialist group is one of those groups where they tried to bring experts from throughout the world so we can hopefully try to collaborate and integrate programs, conservation programs worldwide.

Q. And this is an invited position selected among your peers and experts in the field?

A. Yeah, it's by invitation. Right.

Q. And you still currently hold that position?

A. Yes, I'm a member of that.

Q. Then explain -- turn to the next page here -- explain what the North American Crane Working Group is and what the workshops are. And we've seen, I think we will see some of the publications of that working group. Explain what that working group is, what they do with respect to whooping cranes.

A. Right. The North American Crane Working Group I believe started in 1985, and it was a way to try to bring together crane researchers and managers, practitioners, anybody involved with cranes, in a coherent group, to share experiences, collaborate on different projects. And as part of that group,

every two or three years, there's a workshop that is put together where everybody comes together and presents their work, or either research results or updates on, for example, the captive breeding facilities, tell everybody else how they're doing, how many birds are still there, how many are producing, et cetera. It's a way to keep people that work on cranes in North America together with others, actually representatives from other parts of the world that also show up to these organizations.

Q. And again, your position there as board member and vice president is an invited position. It's not something you just pay dues, and all of a sudden you're there.

A. Well, it's an elected position, yes.

Q. Elected? Fair enough. Among your peers in the field?

A. That's correct.

Q. The -- now, explain -- we've heard, had academic experience. Explain what classes you've taught. And we have them listed out here.

A. I've taught animal ecology, wildlife management techniques, ornithology --

THE COURT: I've read it.

MR. MUNDY: Okay. And Your Honor, we're going through an unusual amount of detail because he has been challenged, in case it does go up on appeal. I'm just trying to make sure I have my bases covered. So I appreciate the

Court's indulgence in that respect.

MR. FERNANDES: We have no challenge to --

THE COURT: Him being an expert.

MR. FERNANDES: On biology and whooping cranes.

MR. MUNDY: All right.

THE COURT: I think the challenge was to him interpreting necropsy reports.

MR. FERNANDES: And his opinions with respect to the reliability of the aerial surveys.

THE COURT: Of what?

MR. FERNANDES: The reliability of the aerial surveys.

THE COURT: Oh, okay. Thank you.

MR. FERNANDES: That may be another issue, because we may have Mr. Stehn now.

MR. MUNDY: Well --

THE COURT: Might.

MR. FERNANDES: Yeah.

THE COURT: But I would let him testify as to probably the aerial surveys, if he's participated in them.

MR. FERNANDES: What were you --

THE COURT: I thought I heard earlier that he had participated in --

MR. FERNANDES: We'll reurge that objection when we get into the cross-examination further.

THE COURT: Okay.

MR. FERNANDES: That's how we've challenged --

THE COURT: Then he's accepted as an expert in ecological biology? Is that what he's --

MR. MUNDY: Your Honor, one of the things he will be doing is testifying about conclusions from the aerial surveys, non-detection of birds and the conclusion that is drawn by experts such as him and the others of the Recovery Team. So I would like to spend, with the Court's indulgence, a few moments, or maybe a bit more than a few, explaining what your involvement has been personally with the aerial surveys with Mr. Stehn. Okay?

THE COURT: I wonder if we should, since we've got 15 minutes left in the day, address the issue of Mr. Stehn with John Smith.

MR. MUNDY: Of course.

THE COURT: Is that all right with you, sir?

THE WITNESS: Yes, ma'am.

THE COURT: You'll have to come back tomorrow.

THE WITNESS: No worries.

THE COURT: Okay. Thanks. Another day without banding.

MR. MUNDY: It's a cold one tomorrow.

THE COURT: It's a cold one today.

MR. FERNANDES: Your Honor, some guidance when we're

working on agreements tonight. We were perfectly happy to allow Mr. Chavez-Ramirez to testify --

THE COURT: Get a little closer to a microphone.

MR. FERNANDES: We were perfectly happy to allow Mr. Chavez-Ramirez tomorrow to testify fully, and then when we close our cross-examination make our challenges, if we can get an agreement that we haven't waived anything by doing it in that fashion.

THE COURT: I will accept that.

MR. FERNANDES: That's much more efficient.

THE COURT: Yes. I just think it's -- it is more efficient. Because it's probably going to be --

MR. MUNDY: I agree.

THE COURT: -- a credibility and weight issue, and not a Daubert challenge.

MR. FERNANDES: And on all of these issues, it's -- we would like to have the Court hear all of the evidence, and then we'll reurge it.

THE COURT: That was one of the reasons that I didn't have the hearing. I thought I'm going to hear them all anyway --

MR. FERNANDES: That's what we assumed.

THE COURT: -- at the trial. So it's expense well, you know, saved.

MR. FERNANDES: Thank you, Your Honor.

THE COURT: So, is Mr. Smith here?

MS. SNAPKA: He's in the hall, Your Honor. I'll go get him.

MR. MUNDY: I'll clear the podium here real quick. May the witness step down, Your Honor?

THE COURT: Yes, sir. Thank you.

(Counsel conferring off the record.)

THE COURT: Thank you, Mr. Smith, for coming over.

MR. SMITH: No problem, Your Honor.

THE COURT: You checked your holster at the door?

MR. SMITH: I turned it off.

THE COURT: Okay.

MR. SMITH: Actually, I'm coming over to try to find out what's going on.

THE COURT: I'll tell you.

MR. SMITH: I've gotten a little bit of the information.

THE COURT: Let me tell you the deal. Mr. Stehn was an employee of the U.S. Fish and Wildlife Service. He's instrumental in creating several reports about mortality and aerial views, coming up with the mortality rates of whooping cranes, through certain years. His data is relied upon by all the Plaintiff's experts. His data is challenged by the Defendants. So I said, "Well, why isn't he here?" And both parties wanted to depose him, and the Fish and Wildlife

Department said, "Oh, no, we've got these," the Touhy requests and all.

MR. SMITH: Right.

THE COURT: You go through that. And I don't know if they followed through, but they didn't allow it.

So I have looked, in the meantime, the way I understand the state of the law now is that there were some amendments legislatively after the Touhy case that said this is not, this, these housekeeping regulations do not legislate a privilege for these executive branches, these cabinets or departments or whatever, but that I should look at documents and determine and listen to any arguments you may have about the confidentiality of the documents.

The way I understand it, there are not any documents involved, he's no longer with the Fish and Wildlife Department, whether that housekeeping provision still affects a retired employee. It may or may not. I don't think it matters.

My concern is this: His reports are in the public venue now. There shouldn't be anything confidential about how he created those reports, what he relied upon in doing these reports. But I think the only issue you may have is to try to convince me for him not to testify because he has some kind of a confidential information. I'm probably not going to buy that, so I'm going to tell you that in advance.

And he seems to be an essential witness for both

sides, and for me in a bench trial, to understand the challenges that the Defendants have and the positions that the Plaintiffs have.

MR. SMITH: Your Honor, I just found out 40 minutes ago about it --

THE COURT: I know.

MR. SMITH: -- so I ran over --

THE COURT: Because I asked them this morning if we had a final pretrial conference -- this is all my fault. I said we didn't need one. So I said, "Where's Mr. Stehn?" Everybody's saying, "I used Mr. Stehn," and they're saying his reports are unreliable, and that's when I found out the Fish and Wildlife Department would not make him available. So I'm going to make him available.

MR. SMITH: All right. I've got a call into Interior, and I told them that I will be getting up with them as soon as I got out of court to go back. I would ask the Court to allow me to report back first thing tomorrow morning.

THE COURT: I will. We're going to be back at 8:30 in the morning, and we're going to continue with another witness. And I think I'd probably like to hear from your guy right after that, if you all are going to be prepared to do so.

MR. SMITH: Okay.

THE COURT: And I wondered if you might be able to communicate first thing in the morning to the two sides to let

them know what your position's going to be. I would like Mr. Stehn to be here --

MR. FERNANDES: Your Honor, if at all possible, our preference would be at least one extra day. He has volumes of documents we're going to have to go through, if the --

THE COURT: He has documents? Did you subpoena duces tecums?

MR. FERNANDES: No, no, that we already have.

THE COURT: Oh, but you would like to work with him, both sides would like to review his documents?

MR. FERNANDES: He's produced hundreds of documents.

THE COURT: They've got his documents.

MR. SMITH: That's my understanding.

THE COURT: So I don't think there's going to be a privilege. I'm going to, as a favor to you, give you my law clerk's memorandum that I told them to write up. Is that okay?

MR. SMITH: That would be great, Your Honor.

MR. BLACKBURN: Your Honor, we don't need any additional time. We've reviewed all of Mr. Stehn's documents. You know, the only thing I would say is, I mean, would be Mr. Stehn, I presume is represented by Counsel, that would be the, you know, that would be the only thing. We're ready to go with Mr. Stehn if, in fact, we need to.

THE COURT: I think so. Let me tell you, I don't mind you just deposing him right here.

MR. FERNANDES: Yeah, okay.

THE COURT: And getting your documents together, what you want to know, how you want to know it, and then you can do that tonight. I just want to kind of strike while the iron is hot with Mr. Stehn.

MR. FERNANDES: Okay.

THE COURT: Before they start all this bureaucratic stuff that we have to cut through and issue some mandamuses and all kind of things. Let's just get him on and out. That's my thought. Sorry, Mr. Smith.

MR. SMITH: No problem, Your Honor. I'll go back and work on it right now.

THE COURT: And again, it looks to me like it's a confidentiality issue, and I don't think there's anything confidential, because they've got every single document already that they want to question him about. They've got his written opinions of every single thing they want to ask him about. So according to the most recent -- and it was 1958, and you'll see in that memorandum -- legislative amendment after Touhy said that this is not to be used as an instrument to prevent the public from seeing important information.

MR. SMITH: Right.

THE COURT: Especially after we all paid for it.

MR. SMITH: Well, and it's my understanding that everything was garnered through FOIA, so I will get with

Interior and determine what their problem was.

THE COURT: And they're not going to ask for any other documents they do not have. Is that right?

MR. FERNANDES: We're going to have to go back and relook at exhibits and whether or not we need to add to the exhibit list and a whole bunch of stuff.

THE COURT: I don't mind you doing that. I don't have any problem with that. But let's do it quickly.

MR. SMITH: And I know from our --

THE COURT: If you could just designate somebody on your team to do that while y'all are doing other things.

MR. SMITH: I know from --

THE COURT: And he just, it seems like the whole crux of so many people from the Plaintiff's case to the Defendants' case is this guy's expertise and his reports.

MR. SMITH: And what I was going to say, Your Honor, is as long as there's no new documents being requested, that helps with my dealings with Interior, because --

THE COURT: None.

MR. SMITH: -- now we're not dealing with document requests, we're only dealing with testimony.

THE COURT: It looks like the bottom line, I might be over reaching on this, is that it's discretionary with me whether to force him to testify. Again, most of the case law has to do with documents. And that's not an issue here.

MR. SMITH: Uh-huh. And I've seen case law both ways. So I don't, I can't report to the Court that I actually have a clear view as to --

THE COURT: I like my way.

MR. SMITH: -- how far that goes. And I understand that. So I will be looking at that tonight and I'll be back first thing in the morning, Your Honor.

THE COURT: Thank you, sir.

MR. SMITH: Thank you.

THE COURT: Okay.

MR. BLACKBURN: And you have no problem with one member or two of the team being missing tomorrow morning?

THE COURT: I do not.

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Why? Where are they going?

MR. BLACKBURN: They're going to be probably looking through documents, Mr. Stehn's documents and getting some --

THE COURT: Oh, okay.

MR. BLACKBURN: -- some exhibits organized.

THE COURT: I'm sorry. I got it. Can you all designate one of your team to do that? Don't you -- y'all don't need that extra table with people?

MR. FERNANDES: Do we need that table?

(Counsel conferring off the record.)

MR. FERNANDES: No, we don't need it.

THE COURT: I feel like a hostess without the seats filled or something.

Okay. Anything else to take up before we come back tomorrow at 8:30?

MR. FERNANDES: I think one other thing, for some guidance when we work on the agreements --

THE COURT: If you want, by the way, about the Mr. Stehn thing, if you tell me at the end of your cross-examination that you've had an inadequate time to prepare, I'll bring him back another day.

MR. FERNANDES: There's another issue that, so we can work on agreements tonight. It would be helpful if we understand the, what the Court's thinking in terms of publications on whether or not we can show some publications to the witnesses during the cross-examination.

THE COURT: Learned treatises are always showable. You just need to tell everybody in advance which ones you're going to do.

MR. FERNANDES: Okay.

THE COURT: It looks like a lot of the people here have published these learned treatises.

MR. FERNANDES: That's --

THE COURT: And I bet I'm going to see similar brilliant experts on your behalf.

MR. FERNANDES: That's what -- I just needed guidance

so we could work on a whole host of agreements tonight and hopefully expedite and facilitate a much smoother --

THE COURT: That's fine.

MR. FERNANDES: -- presentation tomorrow.

THE COURT: It's just such a pleasure to see such brilliant lawyers and great witnesses. I mean, I'm honored.

MR. FERNANDES: We're honored to be here.

THE COURT: Anything else?

MR. MUNDY: No, Your Honor.

THE COURT: All right. Thank you very much.

MR. MUNDY: Thank you.

THE COURT: Then you're excused till the morning, till tomorrow.

MR. BLACKBURN: May we leave our materials in the courtroom?

THE COURT: There's not -- we don't have anybody coming. I don't have any hearings tonight, nothing in the morning. We'll get the courtroom locked up. You can leave everything here. All I'll ask you to do is that you clean up your bottles, because I won't have housekeeping come in at all tonight.

MR. BLACKBURN: Okay. We will kind of clean up the area.

THE COURT: That will be good.

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Dust it up.

(Proceedings concluded at 5:25 p.m.)

I, court approved transcriber, certify that the foregoing is a correct transcript from the official electronic sound recording of the proceedings in the above-entitled matter.

/s/ Molly Carter — January 27, 2012

Molly Carter — Date

INDEX

DEFENDANTS' EXHIBITS (CONTINUED): RECEIVED

IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	*	CIVIL ACTION
PLAINTIFF,	*	CA-C-10-075
VS.	*	
BRYAN SHAW, ET AL.,	*	CORPUS CHRISTI, TEXAS DECEMBER 6, 2011 8:27 A.M.
DEFENDANT.	*	

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TRANSCRIPT OF BENCH TRIAL - DAY 2

BEFORE THE HONORABLE JANIS GRAHAM JACK
SENIOR UNITED STATES DISTRICT JUDGE

APPEARANCES:

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(The proceedings began at 8:27 a.m.)

(Call to Order of the Court.)

THE COURT: Mr. Smith, what's the word?

MR. SMITH: Good morning, Your Honor. After late night consultation and a little arm twisting, I've convinced the Department of the Interior not to challenge the subpoena as to Mr. Stehn. I've also conversed with the attorneys for both sides and that there are no other Department of the Interior employees that are on the radar to be subpoenaed, which was one of the concerns. And while I --

THE COURT: Yeah, once you start, you keep bringing them on, yeah.

MR. SMITH: Exactly. And since the Court was good enough to share with me their memorandum, I thought I'd take the opportunity, from the Department of Justice's standpoint. And since I seem to have most of the attorneys in the State of Texas here, that the proper, from our standpoint, the proper way to challenge that determination would be APA review, because that gives everybody the opportunity and the notice to come in, and then usually in these situations, we're not under the gun.

THE COURT: Well, see, they did the right thing. I didn't.

MR. SMITH: Okay.

THE COURT: This was my subpoena.

MR. SMITH: I understand, Your Honor.

THE COURT: So chastise me, but not them.

MR. SMITH: Well, and what I'm hoping to do is prevent me from being held in contempt in some future proceeding because I've gotten up here and I have to say, "Well, we're not going to obey a trial subpoena because we think it should be APA reviewed." But anyway, so based on that, Mr. Stehn is here and available, and --

THE COURT: I appreciate your hard work.

MR. SMITH: -- there will be no challenge to his testimony.

THE COURT: Thank you very much, Mr. Smith.

MR. SMITH: Thank you, Your Honor.

THE COURT: Good job. Now, do we want to continue on with Mr. Chavez-Ramirez, or do you want to start with Mr. Stehn?

MR. BLACKBURN: I'm willing to go forward with Mr. Stehn if he's here. It's just kind of whatever pleases the Court.

THE COURT: No, it's up to you all.

MR. FERNANDES: Our preference is we finish Mr. Chavez-Ramirez and then we start with Mr. Stehn.

THE COURT: Then if it doesn't matter to you --

MR. BLACKBURN: I'm willing to go early. I don't -- I mean, how long, Mr. Fernandes, how long do you anticipate

being with Mr. Stehn?

MR. FERNANDES: Probably, I can't imagine more than an hour, hour-and-a-half max.

THE COURT: Well, then I'd rather go with Mr. Stehn, since the whole crux of this is all -- all the crux of the cross-examination of all these people is Mr. Stehn's mortality statistics.

MR. BLACKBURN: I would prefer to go forward.

MR. FERNANDES: It's, Your Honor, in all due candor, that would give me just one more hour at lunch to finish up the outline of Mr. Stehn.

THE COURT: Finish up what?

MR. FERNANDES: My outline on Mr. Stehn. There was a lot of material we were putting together late, late last night trying to get ready for the examination.

THE COURT: Well, I think when somebody whines, they ought to win, don't you think?

MR. FERNANDES: Well, you know, there's always one time on every trial --

THE COURT: I will agree with you to let you do that. Now, you get one in the future.

MR. BLACKBURN: I'm sure I'll be whining somewhere before this is over, so --

THE COURT: All right. We probably all will. Why don't we go ahead with Mr. Chavez-Ramirez. My only concern

was, is that he may have to be called back.

MR. FERNANDES: Thank you, Your Honor.

MR. BLACKBURN: Your Honor, may I ask -- one thing would be the scope of the examination of Mr. Stehn. Are we going to limit it to his mortality --

THE COURT: I haven't limited to it anything.

MR. BLACKBURN: Okay. So it's not limited as we're starting at this. Okay, thank you.

MR. FERNANDES: One other housekeeping matter before we start, so hopefully we have a lot smoother day than yesterday --

THE COURT: I thought it was pretty smooth yesterday, covered a lot of ground.

MR. FERNANDES: What we're going to -- if we could cover the last few exhibits, and that way all of the exhibits that are going to be used today are in, and hopefully we can have a smoother day.

THE COURT: Hold up. Would you give me the exhibit list, please? Thank you. Okay.

MR. TAYLOR: All right, Your Honor. Defendants offer Defendant's Exhibit 1, 3 and 4, 7, 14 and 15, 17 and 18, 20, 36, 37, 42, 70, 76, 79, 89, 107 through 109, 111, 114 through 116, 123, 127 through 142, 148 through 151, 156 through 159, 161 through 162, 164 through 172, 173 through 193, 226 through 228, 233 through 235, 237, and then 242 and 243.

THE COURT: Any objection?

MR. WAITES: No objections, Your Honor.

THE COURT: Those are admitted, Joint Defendant's Exhibits. Plaintiffs?

MR. WAITES: At this time, Your Honor, Plaintiffs offer Plaintiff's Exhibits 22, 25, 27 through 32, 35, 75, 111, 162 through 169, 199, 202, 229 through 231, 233, 270 --

THE COURT: Hold up. 233?

MR. WAITES: 233.

THE COURT: 273?

MR. WAITES: No, Your Honor. It was 270 through 284. 286 through 292, 297 through 318, and 320 through 352.

THE COURT: Any objection?

MR. TAYLOR: No objection, Your Honor.

THE COURT: Then those are admitted.

MR. SMITH: Your Honor, if I may, one other thing. One of the, in going in the decision, Mr. Stehn has been spending the last month retired from the Department of the Interior, so I was going to bring that to the Court's attention, because I don't have any position for the Department in this, but at the end of this trial, should the Court decide he, as an expert witness, is entitled to any compensation for his time or any of that, he's here privately on his own time at this point. I just wanted to bring that to the Court's attention.

THE COURT: Oh, yeah, I think that's a good idea. Can you all agree to compensate him?

MR. FERNANDES: We wouldn't have any objection to that.

MR. BLACKBURN: Yes, Your Honor.

THE COURT: I think he ought to be compensated.

MR. SMITH: And I just wanted to bring that to the Court's attention, one way or the other.

THE COURT: Thank you very much.

MR. SMITH: With that, I've given my number to a number of Counsel, so I will return if --

THE COURT: We've got your number.

MR. SMITH: May I be excused?

THE COURT: Yes, sir. Thank you.

All right. With Mr. Chavez-Ramirez -- Dr. Chavez-Ramirez, I'm sorry. Are you chewing something?

THE WITNESS: No, ma'am, a cough drop.

THE COURT: You want to take it out? Thank you.

THE WITNESS: Good morning.

THE COURT: Thank you. Good morning.

MR. MUNDY: Your Honor, we have, just while he's taking the stand, one of the exhibits that was shown to Mr. Fernandes we'll be using today as a demonstrative, if I may go ahead and give the exhibit number. And it's been shown and there's no objection, Page 371, but it's really truly just

demonstrative only.

THE COURT: What's the number?

MR. MUNDY: 371.

THE COURT: Are you going to offer it?

MR. FERNANDES: We're back to where we were yesterday. We both have, we had some demonstratives that neither one objected to, and we think it will really speed this up on the presentation.

THE COURT: All you have to do is offer them. And if they're not objected to -- the problem was that the other side didn't get to look at them yesterday.

MR. FERNANDES: Yeah, okay.

THE COURT: And I assume you've exchanged your demonstrative --

MR. FERNANDES: We have. Okay.

THE COURT: It's just helpful to me if you want to offer them and I can admit them. If there are objections, then I won't admit them. Any objection to --

MR. MUNDY: 371.

MR. FERNANDES: And that's -- because we --

MR. MUNDY: That's the --

MR. FERNANDES: -- we didn't talk about them being admitted, so you don't have any problem with ours being admitted?

MR. MUNDY: No.

MR. FERNANDES: Okay. No objection.

MR. MUNDY: And then we will have some --

THE COURT: See, I like to have them, because as you know, I'm not going to have a decision for you at the end of the trial. I just want to give you a heads up. It's going to take a lot more work. I may have an idea of what I want to do, but it's going to take a lot of work. And so go ahead.

MR. MUNDY: And then we're going to have, just for housekeeping, while you have your list out, we're going to have some excerpts from a learned treatise. They've been shown to opposing counsel. He has no objection. But want to use your overhead like we did yesterday --

THE COURT: That's fine.

MR. MUNDY: -- where the witness marks them and so forth, so I'll mark that as 372, with just the various page numbers highlighted for Your Honor's record.

THE COURT: Can you clip it together for an exhibit then?

MR. MUNDY: Yes, Your Honor.

THE COURT: Actually --

MR. MUNDY: Yes, I can.

THE COURT: Okay. Okay.

MR. MUNDY: All right.

THE COURT: Now, how are you going to work on your outline while you're cross-examining? Never mind. Go ahead.

MR. FERNANDES: It's when I swallow that lunch over 45 minutes.

MR. MUNDY: All right.

THE COURT: Mr. Chavez-Ramirez, if you need cough medicine, it's okay. It's just you're so soft spoken --

THE WITNESS: I understand, ma'am.

THE COURT: -- anything like that can interfere with the recording.

THE WITNESS: Sure. I'll --

THE COURT: So we'll take a break if you need one.

THE WITNESS: Very good.

THE COURT: Thank you.

THE WITNESS: Thank you.

MR. MUNDY: And Mr. Waites has brought to my attention that there was a misnumbering of an exhibit. We've been reviewing the thesis yesterday. That's Defendant's Exhibit 122. And just in abundance of caution, would like to reoffer that under that number, so there's clarity in the record, make sure --

MR. FERNANDES: No objection.

THE COURT: What number -- what is that?

MR. MUNDY: DX, Defendant Exhibit 122. There was some confusion about the numbering yesterday apparently. That was the thesis, Your Honor.

THE COURT: Defendant's Exhibit 122?

MR. MUNDY: Correct, Your Honor.

THE COURT: I don't think that was admitted.

(Counsel conferring off the record.)

MR. MUNDY: He's changed his mind. Once again, this is 121. He's giving --

THE COURT: Well, that was admitted.

MR. MUNDY: Okay. Is that the final answer?

MR. WAITES: Yeah, that's it right there.

MR. MUNDY: Okay. All right. Dr. Chavez-Ramirez, good morning, sir.

THE COURT: Wait a minute. Let me make sure. I think -- I think I saw it admitted yesterday. 122 is not there.

FELIPE CHAVEZ-RAMIREZ, PLAINTIFF'S WITNESS NO. 4, SWORN

DIRECT EXAMINATION (Continued)

BY MR. MUNDY:

Q. Dr. Chavez-Ramirez, you were in the courtroom yesterday, heard the testimony of Doctors Sass and Ensor showing their conclusions about the correlation, cause and effect of the inflow and the mortality. Correct?

A. That's correct.

Q. And just to make clear to the Court, let her know where we're going, what you're doing is explaining, we're right now laying the foundation for your experience and expertise, but explaining the actual field biology from your personal

observations and training about the biological underpinnings of how that ecosystem works. Okay?
A. Sure.
Q. And we heard that you had spent 300 days actually doing field observation in the refuge. Correct?
A. For my dissertation, yeah, that's correct.
Q. Yes, sir. I guess and you've had more days since then --
A. That's correct.
Q. -- of field work? Do you know of anybody, any researcher that has spent more time doing direct field observation of whooping cranes than you?
A. I do not.
Q. Okay. And the, with respect to wildlife ecology, wildlife study, wildlife sciences in general, how important is field observation as providing the foundational research, observational data from which research is drawn?
A. Well, I would venture to say that the entire science of ecology, the science that studies the relationships of animals with their environment and animal behavior are all based on observational studies for the most part.
Q. Okay. The -- you have published numerous journal articles in peer-reviewed journals through your career. Correct, sir?
A. That's correct.
Q. I want to focus in on those that deal with research you've drawn from field observation, and just explain to the Court

briefly how you make the observation but then actually go back later, even years later, review it, analyze it and formulate your research and whether that's a typically used technique and methodology in wildlife sciences.

A. Sure. Well, some of the projects that are, the projects that are highlighted here, or publications are publications from which I gathered the information while conducting my Ph.D. dissertation at Aransas during that '92 through '94 winter. In some cases, I started keeping records, for example, "Sex-Biased Kleptoparasitism of Hooded Mergansers by Ring-Billed Gulls" is something I started collecting data because I was in a blind trying to collect information on whooping cranes. The whooping cranes were not visible to me, but there was other organisms moving around the environment. I started recording foraging activity of the hooded mergansers, the differences between the sexes and the success rates and how many fish they caught. And then a gull came and started trying to take the food away that the mergansers were trying to pick.

So over an afternoon, maybe a little longer, all I did was collect information on what the birds were foraging for, how successful they were and how successful the ring-billed gull was at taking that food away from them.

And after going back and reading the literature, I realized that this was not something that had been reported previously in the literature. So I wrote it up, saw a pattern,

in that the gulls were primarily trying to steal food from the females, not the males. So there was a very striking difference there that appeared once I summarized all my notes. And so I wrote that up as an article and submitted it to The Wilson Bulletin for review and eventually publication.

Q. And in the field of sciences related to bird science, which is called ornithology and related fields, how prestigious is The Wilson Bulletin?

A. Well, The Wilson Bulletin is one of the oldest, probably the second oldest ornithological journal in North America.

Q. Named after Alexander Wilson, one of the early pioneers of American ornithology?

A. That's correct, yes.

Q. And is this -- many of these publications, as you said, several of them come from your actual field observation time at the refuge, you used it to do obviously research and analysis for cranes, and then you also use it to go back retrospectively and you find patterns related to other biologic effect?

A. That's correct. I mean, in a lot of these cases, I was just recording data on a daily basis or weekly basis, depending on different, what project we're talking about. And the patterns that became apparent were not apparent to me until after I collected the entire data. So I had no a priori hypothesis or thought as to what I was getting with those, that information at that time.

Q. Okay. And have you had research accepted and published in peer-reviewed journals related to whooping cranes?
A. That's correct.
Q. And explain just very briefly the nature of your publications.
A. Well, one that's highlighted here is "Ecological Correlates of Whooping Crane Use of Fire-Treated Upland Habitats." Most of that information came from some field observations that I did while I was there, but also a significant database that Tom Stehn had collected over the years. So I looked at all the files they had at Aransas, plus my own observations during my time there, and submitted that to Conservation Biology Journal.
Q. And as a member of the International Crane Recovery, Whooping Crane Recovery Team, do you see a lot of the published literature with respect to whooping crane research or issues that affect whooping cranes?
A. Yes, sir.
Q. How, how widely used and relied upon is Mr. Stehn's data and observation?
A. Well, it's absolutely critical. Many of the studies that exist are based on, on Tom Stehn's data.
Q. Widely used by researchers other than you?
A. Oh, yes, by far. There's much more publications that use Tom's data that are not mine, that use it.

Q. And policy makers?
A. I think all the State agencies received Tom's information on a yearly basis.
Q. All right. Now, the, in as far as your field observations, it's nothing fancy. You're sitting out in the equivalent of like, of a little deer hunting blind or duck hunting blind and just watching, taking notes of what you see, and then later going back to analyze for patterns?
A. That's correct. Sometimes just trying to sneak at them, crawling on the grasslands. I mean, it depends on how --
Q. And what type of things, you know, average day when you're going out in the refuge to do field observations of the cranes, just explain to us what type of things you're looking for and just noting, recording.
A. Well, obviously for my dissertation, there were very specific things I was recording. I was looking for crab abundance by trapping them, clam abundance by going through sediments, snails, wolfberries. All that was sampled on a very regular basis.

Since, when I started on my Ph.D., I had not spent any time with whooping cranes at the time. I spent a lot of time just trying to detect patterns of the cranes. So I spent a lot of time just trying to document how cranes moved in their territory, for example, just by spending entire days out there basically looking at which, how far they moved, at different

times of the day, any unusual -- to me everything was unusual to me, obviously, the first year. But any movement of birds out of areas was something I would note. So I would try to keep track of as many things as I could at the time --

Q. Okay.

A. -- in addition to what I already had, specifically was sampling for.

Q. All right. Now, how many times have you personally flown in the airplane to do the whooping crane census?

A. Well, I flew at least the two years of my dissertation winters, and then I flew maybe a year or two after that also with Tom, so I'd say 30 or 40 maybe.

Q. And --

THE COURT: 30 or 40 after your dissertation.

THE WITNESS: No.

THE COURT: Or 30 or 40 altogether?

THE WITNESS: Probably total.

THE COURT: Thank you.

BY MR. MUNDY:

Q. And was that with Mr. Stehn?

A. Yes.

Q. And so you personally were in the plane when Mr. Stehn was conducting the census?

A. That's correct.

Q. And if you would, explain the difference in the terms

"census" versus "survey," what those mean to you.
A. Well, my impression is that Tom was trying to get a complete count or census of the birds that were in Aransas and surrounding areas at that time, throughout the entire distribution. So he was trying to get the complete number of birds in the area.
Q. An absolute count?
A. Correct.
Q. True, count every single individual out there?
A. That's right.
Q. That's what is meant by "census"?
A. Right. That's my take on it.
Q. Now, explain the use of a survey, like one of the transect counting sparrows and statistical estimation. What's the difference of that versus what Mr. --
THE COURT: Like three per acre, and then you can extrapolate from that?
MR. MUNDY: Correct.
THE WITNESS: That's correct, ma'am.
THE COURT: That's a survey?
THE WITNESS: Right.
THE COURT: Okay.
BY MR. MUNDY:
Q. But that's a statistical estimation, not an actual absolute count of individuals.

A. Right. If we -- generally, when we do a survey, it's because we know we cannot cover the 100 percent of the range of a species, for example, so we cover a percentage of it. And then, as Your Honor has mentioned, you extrapolate to the rest of the area.

Q. Okay. Trying to do the statistical estimation of the total population.

A. Correct.

Q. That is not what was done for the whooping cranes.

A. No.

Q. No statistical estimation of population was done for the cranes. It's a count them, one, two, three, absolute, we're counting every one out there?

A. That's correct.

Q. Okay. Now --

THE COURT: I always wondered how that was done. You know, you see in the newspaper in the morning, 84 appeared, 110. So that's from those aerial views.

THE WITNESS: That's Tom's information, ma'am.

THE COURT: Okay.

THE WITNESS: From the aerial surveys, yes.

THE COURT: I didn't think there was a check-in gate at the --

THE WITNESS: That's right. That would be nice, though.

THE COURT: It would, wouldn't it?

MR. MUNDY: Make it a lot easier.

BY MR. MUNDY:

Q. From your personal experience riding in the plane, what's the average height you're flying above the ground looking?

A. 150 feet probably.

Q. Okay. And how long are the flights, actual time up in the air looking around for the birds? What's a typical day, from your personal experience?

A. Well, it's obviously changed since I flew with Tom, because birds have increased, and there's more area to cover. But back in those days, we were probably flying five, six hours, occasionally a little longer when birds were missing or there was need to search in other places.

Q. Okay. And yesterday --

THE COURT: And now it's longer?

THE WITNESS: Sorry?

THE COURT: Now it's longer?

THE WITNESS: Yeah. The range is much, is much larger than when I was flying, so yeah, it takes a little while.

THE COURT: What kind of a plane?

THE WITNESS: Well, it varies a lot. Tom can give you all the --

THE COURT: Depending on what you can get?

THE WITNESS: Yes. Cessna 182, Partenavia from Fish and Wildlife, so it varies, depending on --

THE COURT: Who flies it?

THE WITNESS: Well, a contract pilot sometimes. Sometimes just Fish and Wildlife pilot biologists. It's also variable.

THE COURT: Do you have to stop and refuel?

THE WITNESS: Yes, generally midday --

THE COURT: Midday.

THE WITNESS: -- you have to get a refueling.

BY MR. MUNDY:

Q. The pilot's not the person doing the counting, the observer --

A. Well, Tom has been the only counter. I mean, obviously anybody else on the plane, like the pilot, can help detect if they're there, but --

Q. Okay. And we saw the map, Plaintiff's Exhibit 45 yesterday, but you try and fly all the general known territories and likely locations?

A. That's correct. The entire known distribution range of the whooping cranes.

Q. Okay.

THE COURT: Now, in 2008-2009 in winter, there was not, there weren't any bad storms during that time period, were there?

THE WITNESS: Wasn't Ike the fall before or something like that? There was some sort of hurricane wasn't it that summer before that?

MR. MUNDY: Let's limit it to central coast.

THE COURT: That was --

MR. MUNDY: That was upper coast.

THE WITNESS: Not during the winter time.

MR. MUNDY: Yeah.

THE WITNESS: Not that I recall. But I wasn't here.

MR. MUNDY: I don't know the answer to that, Your Honor.

MR. FERNANDES: Insofar as it affecting flights, no.

THE COURT: Okay.

MR. FERNANDES: There was only one flight that was cut short because of thunderstorms.

THE COURT: Okay.

BY MR. MUNDY:

Q. Now, we're going to talk about -- in a moment, you'll see some actual real photos that you personally took from the plane. Right?

A. Correct.

Q. And just to kind of help us all become birders, real fast, explain the -- let me --

THE COURT: What exhibit number is that?

MR. MUNDY: 371, Plaintiff Exhibit 371, Your Honor.

BY MR. MUNDY:

Q. Explain what is meant by "posture differences." And where does this slide come from actually? I should take, back up one step. Where does this slide come from? How did you create this?

A. Well, this is from a presentation that I used to train new, new observers when they were going to do surveys for whooping cranes along the Platte River.

Q. And how many people have you personally trained through the years?

A. Um --

Q. Give you a memory test. A good number?

A. Dozens. I mean, I can't --

Q. Okay.

A. Never keep track really of specifically --

Q. That's something, though, as part of your work with The Crane Trust and the Platte River, you were training aerial observers?

A. That's correct.

Q. Okay. And this is just one slide from your training series?

A. That's right.

Q. Okay. And explain, explain to the Court what is meant here, "posture differences in white birds"?

A. Well, when you're flying in -- I mean, most, even though

some of the people that were going to do the surveys were biologists already, some were fairly young and had never flown from an airplane. And when you look at the world from an airplane relative to the ground, things are very different. I mean, it's -- the first few times it's quite a shock. You -- the world's moving very fast, and things look unlike what they do from the ground obviously, looking from above versus straight out.

So one of the things that I came up with after flying a lot of times -- well, there are things that can confuse new observers from the air are other white birds. Pelicans, great egrets, for example, herons. In that environment, until you learn how high you're flying and how big things should look like to you, you could confuse a snow goose for a whooping crane, because all you're looking for is a white dot in the landscape.

So this was, in addition to showing some pictures for training, I was telling them to look at the posture of whatever white oblong they were looking at and how high that white blob was above the ground or the water. Because a pelican will always be flat on the ground or the water.

THE COURT: That's the middle one.

THE WITNESS: That's correct. And it also would be the shape that a goose would have as well, short, squat, horizontal, and close to the ground or water. Herons have

this, what I call almost a quasi-erect posture, and almost straight in some cases, not always. They are taller, and generally the neck is folded in, so you can't, you won't be seeing much of a neck.

And cranes have this, to me, angled posture of the body at about 45 degrees, and high above the water. So if you, if you could see nothing else except the white blobs on the landscape, this was a way for me to try to eliminate pelicans, geese and herons before they could confirm whether they saw cranes or not.

BY MR. MUNDY:

Q. Some of the observers you're training in the Platte River might have had birding experience, some of them might not have?

A. Most of them were either biologists that work for the State or some other agencies, or students that are fresh out of school. But yeah, they all should have had some birding experience at least.

Q. And would you, from your experience, would somebody with even moderate level birding experience, these are very common techniques and patterns that are used in field ID skills by birders?

A. That's right.

Q. Okay.

MR. MUNDY: I'm sorry, Your Honor.

THE COURT: Say "sorry" to Ms. Gano.

MR. MUNDY: Sorry, Ms. Gano.

I'd like to next go -- Mr. Waites, if you could pull up 311, Defendant Exhibit 311.

BY MR. MUNDY:

Q. This is one of the Defendant's exhibits of an aerial photo. I don't know if this is one you took or somebody else took. Did somebody else --

UNIDENTIFIED SPEAKER: Do we need to go down a little?

MR. MUNDY: Yes. Okay. May we have the ELMO, please? Going to lose a little bit of our quality, but we'll do the best we can.

BY MR. MUNDY:

Q. Defendant's Exhibit 311, it's not showing up particularly well here. Explain the habitat, and even from this kind of murky, things look like a sasquatch photo, can you make out --

A. Yes, sir.

Q. -- and differentiate whooping cranes from great egrets in this photo?

A. Sure.

Q. I'll give you the pointer.

MR. MUNDY: May I approach the witness, Your Honor?

THE COURT: Yes, sir.

THE WITNESS: There's two whooping cranes in this picture, one there, one there, and everything else is very

likely great egrets, potentially a snowy. This picture is of a salt marsh, and I'm not exactly sure where, but it's, clearly it shows the vegetative flats and some of the open water areas.

BY MR. MUNDY:

Q. Okay. I want to go next to 173. Mr. Waites thinks he has the computer running again. We can give it one more try. There we go, a little better picture then.

Explain to us what we're seeing in 173 and who took this picture.

A. I think this is one of my pictures. You can see the shadow of the airplane there in the top.

Q. Point to the shadow of the plane.

THE COURT: I can see it.

MR. MUNDY: Okay.

BY MR. MUNDY:

Q. Explain to us --

A. And these basically are eight whooping cranes of, in, it looks like the bay to me, because it's totally open water, but it could be one of the large lakes in Aransas or Matagorda, so I can't be sure.

Q. And what type of food are they looking for? We see them down, putting their heads down looking for food or eating apparently. Is that what they're doing?

A. Yeah. I would think that a bird that's like this one here, where their head is submerged, are really likely digging

clams.

MR. MUNDY: Okay, if we can go to 174 next, Mr. Waites.

BY MR. MUNDY:

Q. Explain the habitat and show us what birds we see in this. Any whooping cranes in here, and other --

A. I don't see any whooping cranes right here, but this is probably the bay area --

THE COURT: You want to roll that up a little bit more? Do you want to zoom it in? Is that on the ELMO or --

MR. MUNDY: It's on Mr. Waites' computer, Your Honor.

THE COURT: Okay.

THE WITNESS: This is the, basically the edge of what I would call the open bays in the salt marsh right there. And then obviously the uplands would be up there. That's a pelican.

BY MR. MUNDY:

Q. Okay.

A. It's not a crane. And these are ducks.

Q. Why do you --

A. I don't know --

Q. Why do you say that's a pelican versus a whooping crane?

A. Well, if we look back to my little posture diagram, you can see there's no legs, it's flat against the water, so it's obviously -- it's not standing above it. The body is

horizontal rather than at angle or vertical.

Q. All right. Let's go to 175, please. And this, is this a typical level of --

THE COURT: I see the airplane.

MR. MUNDY: It's pretty easy on this one.

BY MR. MUNDY:

Q. Is this a pretty typical level at which you fly over the marsh looking for the cranes?

A. Yes. Yes. This is --

Q. And what do we see here?

A. This is a salt marsh picture, different -- you can see different patches of different vegetation, some cord grasses here. The rest of it is just your typical salt marsh of sea oxeye daisy, glass water, salt water, things of that -- wolfberry. And we see two whooping cranes and a, probably a great egret.

Q. Okay. Then go to 176. Are you just taking these with a little point and shoot type camera?

A. Back in those days, those things did not exist. This is basically a 35 millimeter camera that I had at the time, just a manual film camera.

Q. I'm more impressed. What are we seeing here? And explain the habitat.

A. Well, this is probably either one of the lakes, or it -- I don't know exactly where it is in Aransas, but this is a family

group obviously, two white birds and a chick. Vegetated flat there, so --

Q. Okay. And if we can go next --

THE COURT: Are aerial surveys used for other, for other species besides whooping crane?

THE WITNESS: Oh, yeah. A lot of species, ma'am.

THE COURT: I mean, all around the world, like --

THE WITNESS: Yeah.

THE COURT: -- polar bears and all kinds of things?

THE WITNESS: Geese. In North America, the North American Waterfowl Council base their winter flight counts of sandhill cranes are counted from the air. A lot of big mammals, elk and --

THE COURT: Caribou and --

THE WITNESS: Yes. In Alaska, everything is counted from the air.

THE COURT: Yes.

MR. MUNDY: All right. If we can go to 177, Mr. Waites.

BY MR. MUNDY:

Q. What's the -- explain the habitat type -- here again, we often, many of us have fished and seen it from the ground level, but this aerial view, kind of explain what we're seeing, how the cranes utilize it.

A. Well, if I'm --

THE COURT: It's a beautiful picture, isn't it?

MR. MUNDY: It really is.

THE WITNESS: If I'm correct, this is probably a shot looking at -- that's probably a spoil island from Intracoastal Waterway in the background. And this would probably be somewheres in the southern part of the refuge. Again, salt flat with open water bodies of different size and the vegetated matrix that I mentioned. But often now -- and then if we went this way a little bit, we'd be over the upland grasslands and shrub lands.

BY MR. MUNDY:

Q. They feed all through these lakes?

A. That's right. This is what a territory would be, very similar to this. In Aransas, the territory edges normally will begin right at the bay edge and up to the end of the salt marsh, at least the defended portion of the territories.

Q. All right. And just in case it goes up on review and we have Judges reviewing this who are not from this area, how deep are these lakes, these water bodies?

A. Most of them are fairly, I think one foot, one-and-a-half occasionally in the bigger ones in the middle.

Q. Okay.

A. But cranes get around them very easily, for the most part. I mean, for us it's a little hard, because it's soft substrate, and we can sink in a little bit. But for cranes, they can

pretty much stay on top of the substrate.

THE COURT: Are you allowed to use air boats in there?

THE WITNESS: Air boats are very noisy and disruptive to the cranes, so we try to avoid that within the crane territorial areas.

THE COURT: Okay.

THE WITNESS: It would not be very good.

THE COURT: Thank you.

BY MR. MUNDY:

Q. And one of the things I should ask and point out --

A. Although it would be nice to get around with an air boat out there.

Q. -- for you or anyone to go out and fly over and do this type of cranes, you actually have to get a permit, comply with the Endangered Species Act and get permission to do this type activity, such as the banding and handling the birds?

A. That's right. And then you've got to get a permit from the refuge as well, of course. And to fly in these aircrafts, you've got to get a certificate of training in low level flying as well.

Q. Okay. And I guess just to -- we can see this is the wings on the top of the plane, so you can see down without looking over the wing and have full -- looks like the top of the wing is caught on the top of that photo there.

A. That's right, yes.

MR. MUNDY: Can we go to 178, Mr. Waites, another example.

BY MR. MUNDY:

Q. Another example, what do we see here?

A. Two whooping cranes right at the edge of the, probably a pond around at the edge of the vegetation.

Q. And go to 179. This is a higher level view. Explain -- obviously that's the Gulf on that side. Where would this be in the refuge complex?

A. This is probably Matagorda Island. Sorry. That looks like the beach over there in the back. And the Gulf, as you mentioned. And then this is the salt marsh portions up to about here. Then there's a small, I guess line of uplands, grasslands and Matagorda as well right behind the barrier of the dunes.

Q. Essentially substantially similar habitat as just crossing Intracoastal Waterway --

A. Sure.

Q. -- coming up to the Gulf?

A. Besides the beach and the dune --

Q. Yeah.

A. -- that don't exist in Aransas, everything else is very similar. Bay, salt marsh, upland.

Q. The cranes do not utilize the open beach side?

A. I think there's been a couple of observations of them on the beach. I've never seen them personally, but I think there are --

Q. A few?

A. -- a couple of sightings of birds on the beach.

MR. MUNDY: All right. Let's go to 180, Mr. Waites.

BY MR. MUNDY:

Q. What do we see on 180? What type of habitat are cranes utilizing here?

A. Well, this is a burn, so these are cranes after an area has been burned. It looks like two, four, five, maybe seven cranes.

Q. Okay.

A. Some sandhills.

Q. All right. Let's go to --

THE COURT: What do they -- tell me what they eat on the burn.

THE WITNESS: Well, in the upland burns, there's a lot of, you know, all the animals that live in grasslands and shrub lands are there, so sometimes killed, sometimes not. But what I've seen them personally eat is like legless lizards, which are common in some of those grasslands, snakes, insects. There's some acorns out there sometimes. So all those, any, hardly, any animal that's out there, they would probably take, small rodent. Although I haven't seen it, I'm pretty sure they

would take.
BY MR. MUNDY:
Q. And the water that we see in 180, is that fresh water or salt water or brackish water?
A. Well, if this picture is of the burned uplands, it's very likely a fresh water.
Q. Okay. Let's go to 181. What do we have here?
A. A crane in flight. I'm not sure where it's coming from, but it looks like it's going into a little vegetated area.
Q. Okay. 182, another higher level view of general habitat. Just explain what kind of habitat we're seeing here.
A. This is another salt marsh image. Obviously this is a little different. I'm not exactly sure, but this looks like San Jose Island to me. It has a lot of open, open water areas.
Q. Go to 183. What do we have here?
A. We have a whooping crane family on a road.
Q. What are they -- what's the one doing with its head down on the road?
A. Well, it appears to be digging or picking up something. I would speculate here that -- I mean, most of these roads are made from shell, so they might be picking up some grit potentially.
Q. All right. And --
THE COURT: Do they need that for digestion?
THE WITNESS: Well, it's kind of unclear, because

when we looked at crane feces, whoopers versus like sandhills, which eat a lot of grit, we know, it's very different. It doesn't look like they take too much grit, because the food comes out in very big chunks out the other end, compared to a sandhill, which we know is, has a craw full of grit.

THE COURT: Grit, okay.

THE WITNESS: So we're not sure. And this is not a very common sight either, so --

THE COURT: Okay.

BY MR. MUNDY:

Q. That was going to be my next question. Is this common or uncommon?

A. It's not very common. I think I've only seen it two or three times. Tom might have seen more of this.

MR. MUNDY: Okay. 184, Mr. Waites.

BY MR. MUNDY:

Q. Just another example of -- well, what is that?

A. Well, it's a crane in flight.

Q. Okay. Any — and let's go to 185. What's that?

A. Two cranes in a small pond, or sorry, pool.

Q. Okay. And these are, again, just to make -- it's obvious, but these are pictures you took from riding in the plane?

A. That's correct.

Q. I mean, are these -- the point being, are these things easy or hard to detect? I mean, do they stick out?

A. Well, I don't think anybody could confuse that, those two birds in that picture with anything else.
Q. All right.
THE COURT: Mostly where they live, it's low vegetation?
THE WITNESS: The vegetation is --
THE COURT: So they don't hide in trees or anything?
THE WITNESS: No, ma'am. It's all the open pictures of the salt marsh that we've been seeing, that's where their territories are.
THE COURT: And from what I've seen here, they live, during the day anyway, in vegetation or land that is shorter than they are.
THE WITNESS: Oh, yeah.
THE COURT: Okay.
THE WITNESS: By far, yes.
BY MR. MUNDY:
Q. And just going to 186 will show a slightly different habitat use, but again pointing out the exact point, very, very low vegetation, very easy to observe, very easy to detect in a typical habitat?
A. Right. This would be, this is what I would call a pool, surrounded by --
THE COURT: Even in the upland areas, it's low, low vegetation?

THE WITNESS: Well, the primary upland areas they use are the burns, which --

THE COURT: Well, that's low, but I'm --

THE WITNESS: The void --

THE COURT: That's the only place they go in the uplands?

THE WITNESS: Well, no, they would go to like fresh water ponds as well sometimes, but the more open the better for them.

THE COURT: Okay.

THE WITNESS: You know, they like open space all around as much as possible.

BY MR. MUNDY:

Q. Like we saw the video of the stock tank with them coming to the stock tank yesterday, there's a big open area margin around so --

A. That's right.

Q. -- so they stick out against the bank of the stock tanks?

A. That's right. I don't think anybody's ever seen them like in shrub land or woodlands, that I know of --

Q. Okay.

A. -- in the winter grounds.

Q. All right.

THE COURT: Say that again.

THE WITNESS: I don't think anybody has ever recorded

the whooping cranes like within woodlands or shrub lands --

THE COURT: Okay.

THE WITNESS: -- on any regular basis.

BY MR. MUNDY:

Q. The refuge does have a oak, heavy wooded oak area, but that has a public tour loop through it. Correct?

A. Well, if we -- even in some of the areas at Aransas that maybe some of these pictures came from, if we look at the bay, salt marsh and the uplands, even though it begins with grasslands and oak scrub, it would eventually move into wood, woodland, you know, woodlands, where I mean you can get lost in there yourself. So the refuge does have those kinds of habitats as well.

Q. But people do not report whooping cranes like the tour loop going through the oak forest in the refuge. That would be an extraordinary report.

A. It would be very rare, but there was -- actually, there's a picture of one from sometime in the '08-'09 winter from --

Q. Yeah.

A. -- a chick, or a juvenile in the tour loop road.

Q. That's an extraordinary --

A. That's correct.

Q. -- finding or observation, isn't it?

A. That's correct.

Q. What, in this pool, this type of habitat, what are they

looking for, in reasonable probability, from your experience and observations?

A. I would say crabs. This is probably an area that had much more water, and as the tides probably went out, isolated, anything that was in the water column there.

Q. Okay.

A. So they would be easy, fairly easy pickings for cranes.

MR. MUNDY: Let's go to 189, Mr. Waites.

BY MR. MUNDY:

Q. Explain this type of habitat, what we see and what the bird's looking for, in reasonable probability.

A. This is what I refer to like a, sometimes a mud flat. When the tides are high in the marsh, the upland portions of the marsh, or some portions of the marsh towards the uplands get flooded. So there's moisture, and that's what this looks like.

Q. Again, birds easy to detect in that type habitat?

A. Oh, sure, very much.

Q. Okay. Let's go to 190, please. What is this habitat?

A. This looks like a burn, several cranes in a burn.

Q. All right. And what are the little mounds, if you will, the white mounds?

A. Gopher mounds.

Q. Okay. And I point that out just for reference, that you can see, after the burning, you can even see this bare dirt

little gopher mounds were highly visible?
A. Oh, yes. Yes.
Q. Even game trails are highly visible?
A. That's correct. Those, you can see some trails in that picture as well, very likely hog trails, because they're kind of curvy, rather than going very straight.
THE COURT: What kind of trails?
THE WITNESS: Probably hogs.
THE COURT: Hogs, okay.
THE WITNESS: Wild hogs, yes, ma'am.
BY MR. MUNDY:
Q. 191, just another picture of the same type of habitat?
A. Right. This seems to be the same area.
Q. Okay. Not going to confuse the cranes for a gopher mound in that scenario?
A. No, sir.
MR. MUNDY: Okay. Let's go to 194, Mr. Waites. And may I approach? It doesn't show so well on the overhead, but may I approach the witness and show him the exhibit?
THE COURT: I think he can probably see it on the screen better.
BY MR. MUNDY:
Q. Can you see --
A. Yes, I've got a pretty good picture here.
Q. Okay. The bird on the right --

THE COURT: See, the reason we don't do that back and forth is it takes you away from a microphone. And you're so used to doing that in other courtrooms --

MR. MUNDY: Good point.

THE COURT: But --

BY MR. MUNDY:

Q. If, if you can, from the photo, the bird on the right appears to have something by its foot. What is that? I don't know if it shows on this screen, but on the monitor, can you see something by the bird on the right's foot? And if so, explain what that is, in reasonable probability.

A. Well, I would almost bet that that is a blue crab.

Q. Okay. And what do the crabs -- how would it catch a crab up in this little muddy area?

A. Well, it -- the water level there in that pool, the crab is, very likely has dug itself into the substrate to try to avoid, obviously, predation. But the cranes -- I mean, I can detect a hidden crab, because their outline is very visible in the mud. So at that water level, a crane could easily detect a hidden crab, and they very likely just pulled it out of the substrate, took it out to the edge to forage on it.

Q. All right. Now, we're not offering you as a crab expert on crabology here, but from your observations, the crabs burrow in, and even when the water recedes temporarily, the crabs remain, and the cranes seek them out in this muddy open

non-covered-with-water area?
A. That's correct.
Q. Okay. 195 --
THE COURT: Well, do you have a crabologist that's going to testify?
MR. MUNDY: We do.
THE COURT: Okay.
MR. MUNDY: Dr. Paul Montagna.
THE COURT: Because I thought you had said earlier on that this gentleman could do an estimate of the crabs.
MR. MUNDY: And he can, but we have an expert who will explain, go into detail about the crab biology and relationship to waters and things like that. But he will explain crabs as part food abundance, availability to the cranes.
THE COURT: Okay.
MR. MUNDY: But there is a crab expert coming, Your Honor.
BY MR. MUNDY:
Q. 195, what type of habitat do we have here?
A. Salt marsh vegetation and some pools.
Q. And do we have -- I don't know if we've had a good picture, there aren't too many closeups of wolfberries. I don't know if you can see, make out vegetation --
A. No.

Q. -- from this level.
A. No. Not wolfberries, for sure.
Q. Okay. But again, even this altered, or this different bit of habitat, detectability is very high, very simple?
A. That's right. Well, it's --
Q. And then the last photo, 196, plane making an angled turn.
A. Right.
Q. And if y'all are running these lines back and forth, why would the plane make a turn circle around, from what your experience is?
A. Well, occasionally there was an uncertainty as to whether the birds were from one territory or another, just to get a better specific definition. Sometimes Tom was reading bands, to try to determine the band combination of birds.
Q. Okay. And for people who grew up duck hunting, we're used to seeing the aluminum bands with numbers. That's not how the cranes are banded, is it?
A. Well, yes and no. They -- most of them have aluminum bands on them. But they're really hard to see.
Q. Y'all aren't, y'all aren't trying to read the numbers from the air --
A. No, no. The birds were banded also with color banded codes, so you have two colors, two colors on each leg, so you would read, like red white, if red was on top and white at the bottom, green yellow, green on top, yellow at the bottom.

THE COURT: What does that mean?

THE WITNESS: Those are just the unique color combination codes for individual birds when they were banded. So they're color codes that you read. So left leg, for example, would be red yellow. Right leg green blue, or something to that effect.

THE COURT: Okay.

THE WITNESS: Just a way to keep track of individuals.

THE COURT: It doesn't identify a bird.

THE WITNESS: Oh, it does.

THE COURT: How?

THE WITNESS: Every, every bird has a different color combination.

THE COURT: Oh.

BY MR. MUNDY:

Q. Okay. Let's play like I'm a whooping crane, band me with your color bands. Explain to the Court how you would put the color pattern on a crane's leg. Let's say left leg, right leg, the differences of the color combinations, and then --

A. Well --

Q. -- the keys y'all keep to record individuals?

A. Before you actually go in the field, you make a big list of all potential color combinations that you have, based on the colors that you are going to use. So you know ahead of time

what the next color combination is going to use, because it's really hard to keep track.

Q. Okay.

A. So every bird is preassigned a number that's, in order that's going to be trapped. So the next bird, we'll say, is going to be yellow, yellow over red, and blue over green, for example. On the left, it would be yellow over red. On the right, blue over --

Q. And so I want to get this real clear for people that haven't done it. On the left leg, you would have a unique pattern. You put the yellow band on the bottom and then a blue band on the top of that, and that would be unique to that bird, and then on the right leg, a different pattern, and then y'all keep a key --

THE COURT: You put four bands on the same bird?

THE WITNESS: There are two bands, Your Honor. There are the --

THE COURT: Like if you could put red over blue --

THE WITNESS: Divided in two.

THE COURT: -- on one, you could put blue over red on another one.

THE WITNESS: That's right. So there are two --

THE COURT: And that's two separate birds.

THE WITNESS: There are two big bands.

THE COURT: Okay.

THE WITNESS: Yes. With -- divided in two colors in the middle.

THE COURT: So each bird has two bands.

THE WITNESS: That's correct.

THE COURT: Okay.

THE WITNESS: And occasionally, back from the, when the band that was done in the '70s and the '80s, they --

THE COURT: The metal bands?

THE WITNESS: The metal band as well, the aluminum band.

THE COURT: When you put the — do you match those, make some recordation when you put on the color bands with the aluminum band that may still be there.

THE WITNESS: The aluminum band on occasion would help the combinations. For example, if you had the same color codes, you could have the same color codes for two birds with a silver band --

THE COURT: I got it.

THE WITNESS: -- called high, for example, which meant it's above the hock, or low, which means it's at the bottom, it's at the base of the foot. So you could use, if you had that possibility, you could use the same color codes, with silver defining two different individuals.

THE COURT: So that could be part of your --

THE WITNESS: That's right.

THE COURT: -- determination.

THE WITNESS: That's correct.

THE COURT: Seems like it would be harder, though, from the air to pick up that one with the silver band.

THE WITNESS: Oh, yeah. You don't, you try avoid those, because sometimes if they're low and they're in the water, like these birds, you can't see it.

THE COURT: Okay.

THE WITNESS: It's impossible.

BY MR. MUNDY:

Q. And where are the color bands placed? Above what I would call the elbow or knee?

A. Yes, they're above. Right.

Q. And then y'all make --

A. The color codes.

Q. The color codes?

A. Some of the silver aluminum bands were actually placed at the bottom.

Q. All right. But -- and then y'all keep a key of the unique color identifying pattern for each bird?

A. That's correct, as far as what territories they were banded in and where they end up.

Q. Now, there are a lot of things that bands can be used for, but what are some of the potential risks or negative consequences to the birds of attempting to band them?

A. Well, every time you trap or capture any wild animal, there's always a risk of injury, because of the trapping methodology, or the handling. One thing that some birds, well animals in general, some animals are very susceptible to what's called capture myopathy, which is mortality induced by capturing and handling, particularly extended capturing and handling.

Q. Basically, in layman's terms, the bird or animal has a heart attack when you try and capture it?

A. It's, it's not exactly a heart attack, but most animals have this reaction to stress, you know. And what we commonly refer to as fight or flee response, is the body of an animal, an organism, even humans preparing for physical activity. So you have what's called chemical energy going to your muscles that you will use either to fight or run away from a predator, for example. When that, when the body of the organism creates this, this chemical substances, which is food for the muscles, and it is not burned up, it becomes toxic and kills the muscles. And that, in -- there's very few cases where capture myopathy -- actually, I don't think there's any cases where once the necrotic muscle has happened, that the bird can survive, or other animal, not just birds.

THE COURT: So is there still a .5 mortality rate with banding?

THE WITNESS: Your Honor, the banding that we've

initiated currently three winters ago, 24 birds, trapped, captured or banded, none of them have -- we have had zero mortalities due to just capture at this point. And the reason we're using the methods we are using is because I had used that leg snare system in trapping sandhill cranes in Cuba, and we've trapped over 150 birds without injury or mortality due to the capture methodology alone.

BY MR. MUNDY:

Q. And you brought that methodology to the --

A. That's right.

Q. -- use with the whooping cranes, based on your experience?

A. That's correct.

Q. Okay. If we can, let me --

MR. MUNDY: Would you go to Plaintiff's Exhibit 31, Mr. Waites? Okay. Let's go to the ELMO. Oh, here we go. Can you enlarge that some? All right. Well, the --

THE COURT: Would you rather use the ELMO?

MR. MUNDY: I think it might -- yes, could we go to the ELMO?

BY MR. MUNDY:

Q. This comes from the 2010 annual report of the U.S. Fish and Wildlife about the whooping cranes. You've seen this table before?

A. Yes.

Q. Explain just in general what these annual reports are and

how they're utilized.

THE COURT: I'm sorry, the exhibit number again?

MR. MUNDY: Plaintiff Exhibit 31, Your Honor.

THE WITNESS: Well, this is, this is a summary table of mortality between 1989 and 2009 in this case.

BY MR. MUNDY:

Q. Right.

A. Mortality reported in, as winter mortality in some columns, and then the twelve-month mortality. There's a, the peak population count is in a different column.

Q. And we're going to explain the table, but I want first to, if you'll explain what the annual reports are --

A. Oh, I'm sorry.

Q. -- how they're utilized, how long they've been produced.

A. Right. There's a report produced annually by Tom Stehn on, basically it's a summary of all activities pertaining to whooping cranes, any activities that are done at the Aransas Refuge and the breeding grounds, any information that we have on migration, for example, any research projects that have started or are underway. So it's just a summary of what has been going on with whooping cranes over the, over a twelve-month period, in essence.

Q. It's compiled, it's a compilation of information from the Recovery Team's activities for the year and --

A. And others. I mean, it's not the Recovery Team, per se,

activities only. I mean, there's, the Canadian Wildlife Service does their counts, so those are reported in there. If any researchers from different universities are doing work, it's reported in there, graduate students' activities related to whooping cranes, of course.

Q. And you kind of beat me to the punch, next question. This is put out as public information and utilized in many different ways by researchers, state wildlife agencies, regulatory bodies?

A. Sure. I mean, the distribution list is pretty broad. But even so, it goes well beyond that, because it's put on many web pages of different conservation groups and things of that nature, so it's very widely distributed.

Q. All right. And, now looking at what is Table 8 from Page 27 of the 2010 annual report, I want to explain first the columns and what they represent. We have flock size April to November.

A. I'm sorry, it's flock size in April, the first column, or the second column.

Q. Okay. And laid out by year. This is a 21-year summary table.

A. Right.

Q. And explain why a, we have a column specific to April, and then we'll go into the other peak count.

A. All right. So the flock size in April is the estimate of

birds, or the count that Tom has made when the birds are leaving the wintering grounds.

The mortality, after they leave Aransas or the wintering grounds in general, there's no way to track individuals until, only during that time period that there was radio birds back in the '80s, and now that, with some of the telemetry that exists right now with some of the, just over 20 birds right now.

So once the birds leave Aransas, nobody knows what goes on. So what has been done here is all mortality that occurred between April and when they returned to Aransas in November is lumped into one category.

For example, we don't know if these birds died in spring migration, died in fall migration, I mean, for the most part, or in the breeding grounds. So this is just a total summary of those mortalities that might have occurred over those three periods.

Q. There's a period in the winter where there are no birds coming down or leaving. They're, they've all migrated from the north down to the coast here, and then it's before any of them start leaving, go back. Roughly what's that period?

A. Late December through mid March.

Q. Okay. And at that point is when there's attempts made to do these actual census, count every single bird?

A. That's correct.

Q. Repetitive flights?

A. Correct.
Q. And I will ask you to assume that the Defendants may call a witness, Dr. Michael Conroy, who may offer testimony to the effect of, if 75 percent of the population are detected on three or more flights, it would result in a 99 percent count or higher than 99 percent count.

Based on your personal ride-alongs in the plane, did y'all count more than 75 percent of the population on three or more occasions?
A. During the years that I flew with Tom, yes, we did, just probably I think just about every -- well, I can't say for sure. I'd have to look at the numbers. But the vast majority of the flights probably involved more than that.
Q. Okay. Would it be fair to say on the vast majority of flights, y'all attempted to count literally 100 percent?
A. That's --
Q. Or darn close to it?
A. That's the goal, yes.
Q. Okay. And did that occur on perhaps four or even more occasions, from your personal experience?
A. Recalling the first winter that I flew, we counted very close to -- I mean, we were up in the upper 90s in several occasions.
Q. Uh-huh.
A. The second year, the proportion of the population that was

actually counted on a flight was much less. It was sometimes below, you know, in the upper 80s, mid 80s.

Q. Okay. But exceeded that 75 percent threshold on at least three or four occasions?

A. Yes.

Q. From your personal experience?

A. Yes, sir.

Q. Okay. Now, the -- explain your understanding, and you've, how many years have you been working with these type of reports? I mean, when did you first start actually looking at these type of annual reports about peak abundance of the flock, mortality?

A. Well, when I started my graduate program.

Q. 1993?

A. In 1992 or so.

Q. '92? So for 20 years now, you've seen this every single year?

A. Yes. Sometimes not as, at the time they're put out, but I eventually try to catch up.

Q. And the -- obviously, as part of the Recovery Team, y'all review this and information at your meetings?

A. You bet. I mean, Tom sometimes receives feedback from individual committee members --

Q. Okay.

A. -- at different times.

Q. All right. And has any member of the team or any researcher other than in the course of this litigation from the Defendants, has anybody ever raised questions about the reliability of these tables, these findings, these annual reports giving the population numbers?

A. Not since I've been involved.

Q. Okay. Now, explain the general pattern, if you will, about what are perceived kind of the, quote, good years, bad years, as we saw with Mr. Sass, and then percentage loss mortality on the winter ground. Do you need the pointer?

A. Yes, because the winter mortality's on the other columns we haven't gotten to. Thank you. So the mortality is over on these, on this side obviously. So winter mortality's here. To me, just an eyeball kind of methodology is just anything with zero, one or two is pretty much a good year. Anything that has values, you know, that range -- well, 23, anything with double digits would be a, what I would call a pretty horrible year, in general. You know, 11, 23, everything else in between would be bad, as far as I'm concerned.

Q. Okay. The -- fair to say from your personal experience with the cranes that the winter of '08-'09 was unprecedented loss?

A. At least since records have been kept, yes, that has been an unprecedented year.

Q. If a bird -- I would like to explore just some alternative

theories the Defendants have raised. If birds went missing on an aerial survey, what attempts, again, from your personal experience, what attempts were made to locate birds missing from known territories?

A. Well, I recall occasionally with, when flying with Tom, that once the survey was complete and there were birds that looked like they were missing from their territory, Tom would make an effort to, on return flights, hit some of those sites, like fresh water ponds and areas where they might have been seen in the past to see if there's any birds lingering in areas that were not part of the survey. So that's one example.

Q. Based on your personal experience doing the flights 30 to 40 times, do you believe, in your opinion, there is any reasonable probability that 23 birds were just simply overlooked for the entire winter season?

A. No way.

Q. How about 15 birds just overlooked for the entire winter season?

A. I do not believe that at all.

Q. Any possibility, from your own personal experience, that even 15 were just overlooked for an entire winter season?

A. Based on the care that Tom takes to not come up with erroneous information, making sure that it's not just one flight that a bird is missing, and trying to connect single birds with missing birds from other territories, I would say

that is just not, would be almost impossible to me. It's 23 birds.

Q. Okay. I want to just put the point of this case to you very plainly. You understand this is a case of tremendous importance to a lot of parties for a lot of reasons. We're here in federal court. You're under oath. I want you to look that Judge in the eye. Do you believe there is any possibility that that event of 23 missing birds is just due to they went missing, hiding for that winter?

A. No, Your Honor, there's -- I find it almost impossible that that could happen, based on the methodology that's used to track them in the winter.

Q. Even if one or two or three or four birds were somehow missed, do you believe it's just to the level of absolute certainty that fifteen or more went missing and hiding somewhere that winter?

A. That's right. I mean, I could buy one or two.

Q. Fifteen to twenty, no way?

A. No way, no.

Q. That's from your own personal experience?

A. That's right. Yes.

Q. Do you know, just kind of touching some bases that have been raised, were there, as far as you know, any hunters shoot any whooping cranes on the wintering ground that season?

A. Not to my knowledge.

THE COURT: Any what? I'm sorry.

MR. MUNDY: Hunters shoot any of the whooping cranes on the wintering ground. Did hunters kill any of the whoopers in the '08-'09 winter?

THE COURT: Okay.

BY MR. MUNDY:

Q. Do you know of any reports of hunters killing?

A. I do not.

Q. Okay. I'd like to go next to Plaintiff Exhibit 111. And looking at Exhibit 111, whooping cranes territories for the winter, again this is well-known, well mapped out through the years. Is that fair to say?

A. Yes.

Q. Let me confer with my colleague for just one moment. I want to make sure I don't misstate something.

A. Sure.

(Counsel conferring off the record.)

BY MR. MUNDY:

Q. Double checking myself to make sure I don't misstate something. Now, the known territories y'all said y'all, Stehn, when you're doing it, y'all attempt to fly all the known territories repetitively through the winter. Right?

A. That's correct.

Q. How many times must a bird be missing from a known territory or family missing from a known territory before it's

presumed missing and dead?
A. I presume at least twice.
Q. Okay.
A. Minimum.
Q. And the colors aren't showing particularly well on this, but the red --
(Court and Clerk conferring off the record.)
THE COURT: Thank you.
BY MR. MUNDY:
Q. Okay. The color's not showing real well, so I'm going to point to it. But these red marks, and then we have yellow marks, as I understand --
THE COURT: It shows well on the individual screens.
MR. MUNDY: Okay.
THE COURT: And I can see it pretty well there. The darker ones are red.
MR. MUNDY: Right. Okay.
THE COURT: The yellow ones are yellow.
MR. MUNDY: Very good.
BY MR. MUNDY:
Q. These are, for the '08-'09 winter, mapping out birds, the yellows, birds that went missing, the reds are ones of carcass location or partial carcass recoveries. Is that correct?
A. Yes.
Q. Okay. And what is the significance to you, from your

experience and training, about the pattern of presumed, or missing and presumed dead mortality over a wide distribution of the bay system? Would that indicate to you like a mass disease event?

A. On the contrary. I mean, when we have mass die-outs in, let's say, waterfowl, for example, there's concentrations in the dozens, hundreds, sometimes thousands of individuals in one specific location. They're not scattered throughout, such as this. And so obviously you have to try to understand whether there might be a disease problem. But based on the pattern of distribution of mortalities throughout the entire range and not focused or centered on a particular area of the distribution, it would be hard.

Q. Okay. Let's use the example of snow geese, which have an outbreak of avian cholera on, say, the coastal prairie here. If there's an outbreak of avian cholera in a snow goose population, where does the die-off occur?

A. Normally occurs within a big pond or lake. So it's very localized. The vast majority of mortalities will be in close proximity to where the origin of the outbreak is.

Q. Okay. And the timing, if you have a big outbreak of, say, avian cholera, what is the timing of the die-off? Is it relatively rapid, or strung out over months?

A. Mostly it's very quick. I mean, obviously the birds, those birds that survive are not going to come back to that

place. But when it's encountered, it's very quick, just hundreds in a very short period of time, days, I mean, more than weeks or months.

(Counsel conferring off the record.)

MR. MUNDY: We're trying to confirm the exhibit number for the record, but we have, it's been shown to opposing counsel. We've read it, and it's admitted.

BY MR. MUNDY:

Q. But Table 5, or excuse me, Table 11, Page 25, from the 209 annual report that reflects the timing of the mortality from December 1 through January multiples, February, March, into April, does that pattern of the timing reflect to you or indicate to you that there is a mass disease event?

A. I would presume it would be very unlikely to spread out that far through time and space, when looking at the map as well.

Q. Okay. Just to exclude, would that pattern to you indicate, say, a big barge chemical spill that perhaps no one knew about, the timing and geographical location?

A. No.

THE COURT: Leave that on for a second, would you?

THE WITNESS: I'm sorry?

MR. MUNDY: Yes, Your Honor. That's Plaintiff Exhibit 32, by the way.

THE WITNESS: The chemical spill would be, or that I

know, there wasn't any chemical spill reported, for one. And the, based on the fact that there's, chemical spill would be unlikely to affect birds on Matagorda Island, for example, in which there are quite a few mortalities, I would say that that's unlikely as well.

THE COURT: So how many of those are juveniles?

THE WITNESS: Sixteen.

THE COURT: Sixteen of the twenty-three?

THE WITNESS: Yes.

THE COURT: And that included the ones that were carcasses?

THE WITNESS: The carcasses were white birds, if I recall correctly. Is that right?

BY MR. MUNDY:

Q. Do you need to double check the --

A. Yeah, I'm not -- I know one was a white bird. I can't remember what the other one is.

Q. Of the necropsy birds, you're talking about?

A. Right.

Q. Okay. But -- so there are no known reports of a, of a, like a barge leaking chemicals or a barge wreck up and down the Intracoastal? No known reports of that?

A. Not to my knowledge.

Q. And the pattern geographic --

THE COURT: Could you leave that back on?

MR. MUNDY: Yes, Your Honor. That's --
THE COURT: I'm still reading it.
MR. MUNDY: Certainly. That's Plaintiff Exhibit 32.
THE COURT: Okay, thank you.
BY MR. MUNDY:
Q. Anyway, just to exclude other alternative potential causes, this pattern time-wise and geography-wise would be incredibly inconsistent with a chemical leak from the Intracoastal shipping activity?
A. That's right. If we can go back to the map, I can kind of point out. The Intracoastal Waterway is here. So any spill in this area obviously wouldn't be affecting, for the most part, some of these birds on this side. So that's why I don't think it's consistent at all. And I don't know of any, I don't have knowledge of any spills for that time period.
Q. Okay.
A. And again, the distribution and time would also suggest that it wasn't a localized event in space.
Q. If it was a barge accident spilling chemicals, it would be localized in time and geographic placement?
A. Right.
Q. All right. We'd then like to next go to the issue of what's known as food stress. For birds that did not die, I want to focus now on birds that -- oh, and I should ask, in the winter of the '08-'09 season, were you called down to the

refuge and your assistance requested?
A. Yes. I was out at the refuge in early February of 2009.
Q. Well, was it just a visit for tourism, or were you called down for a reason?
A. I wanted to go fishing. Mr. Stehn called and asked if I could come and visit the refuge. He was, he had concerns about the patterns that he was observing, like from the air, of birds moving to locations where they weren't commonly found, a lot of birds in the uplands, and fresh water, and he had detected mortality by that point in time.

So he was very concerned about the status of the population at that time and asked me if I would come down and take a look and see, based on my experience on the ground trying to document foraging and food availability, if I could give, see if I could give him any extra information about those issues.
Q. Basically to repeat what you had done during your years in the Ph.D. field observations, go out and observe and see what, if anything, you could determine?
A. Right. I don't think he said, "Repeat what you did for your dissertation." But he said, "Could you just" -- I took it as well, since I have that information that I can use as baseline, I'll do something similar to compare what's going on during those days I'm in the field to the previous information I had collected.

Q. Okay. And when did you come down? What month?
A. February, early.
Q. Of '09?
A. '09, yes.
Q. And how long did you stay out in the field doing actual field observations?
A. Five days.
Q. And do essentially the same type of observation activities and look for the same things you did as when you were doing your Ph.D. dissertation observation?
A. Yeah, not exactly. In some cases, yes. In some cases, no. I mean, I did very quick walking transects along the marshes to see if I could detect crabs and look at wolfberries and anything else I could find. At that point in time, I had an assistant with me who, in addition to my own looking around, she was recording a video of cranes in different places as well, so we could then go back and look at foraging rates and time-activity budgets and things like that sort.
Q. Okay. And based on your observations in the February of '09, what did you see as far as food availability for the cranes and their success in capturing food?
A. Their success in capturing crabs was very low, for example, much lower than what I considered a bad year back in my dissertation days. It was even lower than that. So that, that was kind of striking. My walks of the marsh did not

reveal a lot of crabs. I detected a few. And water levels were, seemed to be that sometimes were completely dry at that point in time. So crabs were either hiding or had moved probably.

Q. Okay. The -- now, we've heard discussion about wolfberry and crab. Mr. Fernandes has raised the issue, well, even if there are no wolfberries, no crabs, there's other things that they are known to eat. Why don't they just go eat all these other things, from your personal observation, and then get along just fine?

A. Well, the list of food items for whooping cranes has been collected over decades. It's in the dozens, obviously. However, when you look at some food items, they have been observed to have been eaten once in decades. Some, a handful --

THE COURT: I'm sorry, say that again. Start over. I'm sorry.

THE WITNESS: Over the decades that we've kept records of what cranes eat, we have generated a long list, probably over 50 food items. Some of those food items have only been reported as being eaten by cranes once, for example, or a handful of times. So the fact that they can eat, for example, angel wing clam, which has been reported. During my sampling, for example, I found no angel wing clams. So the fact that they consumed it at some point in the past doesn't

mean they can go out and consume them at the present. Because I don't know why they're gone, but they're not there any more. They can eat snails, for example. We know they do that. There are several species of snails. I've personally seen them eat snails.

MR. MUNDY: All right. Let's look at Plaintiff Exhibit 42. Can we turn the lights down just -- thank you.

BY MR. MUNDY:

Q. Explain -- this is a table you've prepared. Correct?

A. That's correct.

Q. Explain what you've done on this table.

A. Well, I tried to go through some of what was published in some of the publications that listed food items of cranes. Some were just lists. Others were more quantitative, for example, from feces in some cases --

THE COURT: The number of this exhibit?

MR. MUNDY: 42, Your Honor. Plaintiff 42.

THE WITNESS: -- direct observations in other cases. And I just, you know, highlighted those that, on the third column is the number of citations that make reference to a particular food item. As you can see, there's some food items that are only cited in one study, over decades. Others, two, three. The only ones that consistently show up over and over again in most of the studies are blue crab, wolfberry, clams are probably of importance there, and insects. So these are

things that show up, that have been reported over different time periods. Some of these observations are from the '40s, some are from the '50s, some the '80s, up to 2000, the present. So they've been distributed in space and time quite a bit.

BY MR. MUNDY:

Q. So, in these reports, we have the citations down here. These are from other observers going back as early as 1946, Stevenson and Griffith, Allen, 1952?

A. That's correct.

Q. And we're going to talk about Allen 1952 in more detail in a moment. I'll just display it here. Explain the significance of Robert Porter Allen's work in 1952 on the whooping crane.

A. Well, this was the very first attempt to try to bring together everything we knew about whooping cranes in one document. I mean, it goes through, even through prehistory in some cases, history, systematics of the species, distribution, historic and present time at that time. He has information on food and foraging, some management recommendations for different places. So this is a very complete, I guess when I was in graduate school, this was kind of those must-reads if you were going to do anything with whooping cranes, because it, up to that point in time, covers the bases of everything we knew about whooping cranes.

THE COURT: What year was that, did you say? 1958?

MR. MUNDY: Two.

THE WITNESS: Two.

THE COURT: '52.

BY MR. MUNDY:

Q. And fair to say this is one of the monumental pieces of research in public literature on whooping cranes, what was known about them, observations?

A. That's correct. I mean, obviously, even though it was published in 1952, it's still, much of the information is still relevant today.

Q. Okay. We know more, but he got a lot of things right?

A. That's correct.

Q. And in 1952, when did he visit the refuge? Do you remember? Or we'll look at some of his tables in a moment.

A. I don't know the exact dates he was at the refuge. I do remember looking at his information. He reports on some feces samples, for example, that he collected at the refuge. And I was very surprised to look at the list of food items in this feces, because wolfberry doesn't show up. Well, he called it cranberry at the time.

Q. Cranberry?

A. Right.

Q. Salt marsh cranberry?

A. Correct. And I was quite surprised, but then I looked at the dates when he did the field work to collect those feces, and it's obvious why wolfberry doesn't show up. It was

collected after the fruiting period of wolfberries. He was there like in February or March, when he don't expect wolfberry to be present.

Q. And we see -- let me zoom up the small print -- he has at Page 111, Table M, Summary of Dropping Analyses, and it gives date collected. January, there's one from December, January, January, January, February, February, so forth. Correct?

A. Correct.

Q. You did feces samples -- well, let's just finish this. It goes on to the next page. You've got a similar type of sampling and collection analysis of the feces of the cranes. Correct?

A. That's correct.

Q. You're used to seeing and reading and understanding these tables?

A. That's correct, yes.

Q. Table, from Page 112, Table N. If you will, explain Table N, the columns, what's reported here and what the analysis is.

A. Well, the column Number of Times Found in Samples refers to number of the food item listed as 1 through 16 there, occurred in the samples he looked at. The Percent Occurrence in Samples is how many samples had that particular food item. For example, in the case of blue crab, 85 percent of the feces samples he looked at had blue crab, for example.

Q. And that would be of the samples collected we saw in the

prior page January, February?
A. Correct. The Total Percentages is just the -- he probably looked at a feces and determined what proportion of that sample was composed of blue crab parts. And so he could have said 50 to 100, or whatever, zero to 100, I guess. And it looks like added all those numbers to come up with that 764, for example, in that case. And, but the average, the next column, Average Percent of Volume Per Sample, turns out that about 58 percent of a feces sample that he collected, on average, had, 58 percent of that sample was composed of blue crab parts.
Q. All right. So for blue crabs, 85 percent of all feces collected and analyzed from those primarily January-February periods, 85 percent of those contains blue crab. Correct?
A. That's correct.
Q. And in analyzing those, breaking it down by volume, 58 percent of the fecal matter was blue crab.
A. That's correct.
Q. More than, more than half --
A. On average.
Q. -- was blue crab.
A. On average, yes.
Q. On average. Now, conspicuous -- you started to explain, conspicuous by its absence, or what we're down is what he reports to as salt flat cranberry. That's what you just said was --

A. Uh-huh.
Q. -- now known as wolfberry?
A. Right. Correct.
Q. And explain, we have Plaintiff's Exhibit 52 -- let me zoom this back out. Plaintiff's Exhibit 52 is prepared -- who did this?
A. This was a graduate student of mine.
Q. Okay. Analyzing fecal samples collected on the refuge in what year?
A. '93-'94 in this case.
Q. Going back to your days of actually doing the collecting?
A. Right. I did a lot of -- I collected a lot of these feces that were eventually processed by the graduate student.
Q. Explain, explain what these lines mean, as it corresponds to the motte.
A. It means that, of all the feces, for example, of all the feces we collected in November, for example, 60 percent of those had, in this case, they were almost identical, 60 percent of those had wolfberry and blue crab. For December, 90 percent of the feces we collected had wolfberry, and about just under 50 percent had blue crab present.
Q. And there's water there, if you need water.
A. Yes. And so on for the other months as well.
Q. So this is doing the same type of analysis as what Allen reported in his table, but you went back -- he started

basically here, where the wolfberries have ripened, the birds have essentially eaten all the ripe fruit. You've had the benefit of collecting samples two months earlier, and then going on out.

A. That's correct.

THE COURT: I'm sorry, what's the number of that exhibit?

MR. MUNDY: 52, Your Honor. Plaintiff 52.

THE COURT: Thank you.

BY MR. MUNDY:

Q. Now, and was the '93-'94, is that what you term a, quote, good year or bad year?

A. This was a, a bad year as far as whooping crane mortality in the wintering grounds.

Q. Okay. And even in that year of bad mortality, crab is still playing a very vital role, large component of their food?

A. Well, we have to be careful when we look at frequency of occurrence. What it says is "crab was present." It doesn't say there was a lot of crab --

Q. Okay.

A. -- or a little crab, so --

Q. "Continuing to eat crab."

A. But the fact that it was still searching and consuming crabs, for sure.

Q. Okay. Now, let's go to Plaintiff Exhibit 53. This is

from the '94-'95 year. And again, explain what the difference is here, compared to the prior year.

A. Well, it's the same kind of information as the number of feces that had either wolfberry or blue crab, depending on what line you're looking at. I mean, obviously it shows wolfberry pretty significant in November, and shows, to me, a very similar pattern of wolfberries very high, and then decreases when it stops fruiting, and then blue crab takes a greater importance as you lose wolfberry as part of the diet. And this is for the winter following the previous graph, '94-'95 in this case.

Q. And you included -- I won't go through all the exhibits, but you included in your analysis the samples collected from the Matagorda side?

A. That's right. When I was doing my work, I was doing collection of data both at Aransas and Matagorda Island.

Q. And shows a similar pattern of the importance of blue crab and wolfberry to the birds on that side?

A. That's correct. Some little differences, but very similar patterns.

Q. Okay. Going back to these other items, as you've alluded to already, there's a long list of things that were reported but constitute very small percentage of use, as shown by Allen in 1952, Table N, Page 112?

A. Correct.

Q. I mean, you see crabs 85 percent occurrence in the samples versus -- what's an amphipod?
A. It's a small aquatic insect, kind of like a small beetle looking thing.
Q. Only detected in --
A. In one feces.
Q. -- two percent of the sample?
A. One feces sample.
Q. Okay. Not commonly utilized. It makes the list of known items, but not commonly utilized?
A. Correct. I don't know that it shows up in any of the work that was done after this case.
Q. Now, in going back to your compilation of reports of food items utilized, we just saw from Allen an illustration of known long listing but low utilization, but here you've compiled again these other things. Blue crabs, hands down, the most reported item by published research and other reporters?
A. Correct.
Q. The, in Item Number 8, which shows up on quite a few of these columns, Greer 2010, have you reviewed the actual field videotapes of Greer?
A. I've only reviewed about 12 hours worth of her, her videos.
Q. She's a PH --
MR. FERNANDES: I'm sorry, I just couldn't hear that

answer.

MR. MUNDY: Twelve hours.

BY MR. MUNDY:

Q. Of the 12 hours of the Greer video, how many did she note food items collected and analyzed by her research?

A. Well, she didn't really collect them. What she was doing was trying to determine the food items that was being consumed by the whooping cranes.

Q. I meant the birds getting them.

A. Okay. Right.

Q. I'm sorry. Let me rephrase my question. How -- she was doing, like you, field observation and videotaping of what the birds are eating?

A. Correct.

Q. How many food items did she note reported on the 12 hours of video that you reviewed?

A. She reports to have identified over 3,000 food items to either species or group, like a snail, but not necessarily what snails.

Q. Okay. And then you personally watched 12 hours of that video for that same period. How many food items could you detect?

A. Well, that I could identify --

Q. Yes.

A. I mean, I could detect that they were consuming something,

but that I could unequivocally identify whatever they were consuming to species or group, only one.

Q. One versus 3,000?

A. That's correct.

Q. Okay. But you went ahead and included her notes on your chart as reference Number 8?

A. Well, she -- these are things that are reported in the results sections of those papers. So that's why it's there.

Q. Now --

MR. MUNDY: And I should ask, is Your Honor's intention to take a midmorning break? We've run about --

THE COURT: I was waiting for y'all to tell me.

MR. MUNDY: It's --

THE COURT: It's time?

THE WITNESS: Yes, ma'am.

THE COURT: Fifteen minutes. Thank you.

THE WITNESS: Thank you.

THE COURT: I don't even think about breaks till somebody mentions it, so feel free.

(Recess from 10:03 a.m. to 10:18 a.m.)

THE COURT: You may proceed.

MR. MUNDY: One housekeeping matter, Your Honor. My colleagues had raised the question, my original intention had been to offer these excerpts from Allen 1952 as Plaintiff's Exhibit 372, with the pages copied of each of the ones I'm

reading to the Court. But they've raised a question concerning whether or not I should offer the entire book, and I'm willing to do whatever you wish.

MR. FERNANDES: We, this is not what we discussed and what we have agreement on, and I will object --

THE COURT: I can't hear you.

MR. FERNANDES: Oh, we will object to them offering the entire publication, or else there's a whole host of publications that will be offered. We had previously discussed an agreement. We had reviewed pages overnight, and that's what we had agreed upon going into today.

THE COURT: All right. Don't click your pen.

MR. MUNDY: I'm sorry, Your Honor.

THE COURT: That's all right. That goes into -- what's the objection?

MR. FERNANDES: The objection is it's hearsay and it's a publication.

THE COURT: Well, you haven't objected to me seeing pages out of it. Is it a learned treatise?

MR. FERNANDES: The reason why we didn't object --

THE COURT: Please get by a microphone.

MR. FERNANDES: I'm sorry. I apologize. The reason why we hadn't objected to the pages is because per the agreement we reached before we started, we agreed not to object to his -- I agreed not to object to his pages, he agreed not to

object to mine. That's why I was not objecting. And --

THE COURT: Well, is it recognized as a learned treatise in the field, as this Dr. Chavez-Ramirez has testified to?

MR. FERNANDES: It is.

THE COURT: It's admitted. Number what?

MR. MUNDY: 372, Your Honor.

THE COURT: I can foresee many books in my future.

MR. MUNDY: It's my personal copy, but I'm happy to volunteer it.

BY MR. MUNDY:

Q. So let's pick up where we left off, and we're going to explore more about the importance of food and how it affects and forms the cranes' behavioral patterns. And we heard some yesterday from Dr. Archibald. You were here for him. Correct?

A. That's correct.

Q. I would like to explore now a little bit more detail the concept of territoriality, site fidelity and site tenacity. If you will please explain what those terms are and the differences between those terms.

A. Territoriality in birds is basically defined as a space that is aggressively defended by either an individual or a pair or a family unit, or in some cases even groups against other individuals of their same species. And the idea there is that by excluding other members of their same species, they're

maintaining access to all the resources within the boundaries of the territory for themselves, whether that be mates, food, nesting sites, whatever the resource happens to be.

Q. Okay. How common is territoriality in breeding areas of birds, on the breeding grounds?

A. Well, most birds are territorial. Well, I mean, there are some colonial birds that are not, but the vast majority of avian species are territorial during the breeding season. That is very common. And there are sampling techniques and survey techniques based on the territoriality of birds to estimate densities and populations, et cetera.

The whooping crane is territorial both in the wintering grounds and the breeding grounds. So the wintering grounds territoriality, which is probably what concerns us here the most, is not as common in birds in general. Most birds, even those that are territorial in the breeding season, generally are not during the wintering grounds. The sandhill crane is a perfect example. It's territorial in the breeding grounds, but in the wintering grounds you'll see them here and anywhere else, they spend the winter in large groups, dozens, hundreds, sometimes thousands. So they, and they don't occupy an area exclusively.

Whooping cranes at Aransas and surrounding areas maintain a territory that they defend aggressively against other whooping cranes during the entire winter season.

Q. What does the published research indicate about the primary reason for whooping crane territoriality on the winter grounds?
A. Well, because, because the wintering grounds are not places where you need to breed, so it doesn't have anything to do with nesting areas. Because it's an area that is defended by a pair, not by an individual looking for mates, therefore it's not a territory for mate acquisition. The only reason you would hold a territory in the wintering period is to procure food resources. The winter period in temperate birds is one of those critical times when food can become scarce. So if you, if you're a crane and you can guarantee access to a certain amount of area where you can have exclusive use of all the resources there, you are trying to ensure your survival during the winter period.
Q. Protect your grocery store, if you will.
A. Correct.
Q. Now, explain what is meant by site fidelity, as compared to site tenacity?
A. When we're talking about migratory birds, we're talking about fidelity to, let's just say to the winter territories. It means that the same individuals, individual or individuals will return to the exact same location, year after year after year. So we have an individual bird coming to the exact same territory, in some cases, over decades, in the case of whooping

cranes.

MR. FERNANDES: Your Honor --

THE COURT: Wait a minute. Say that again. Is this site fidelity we're talking about?

THE WITNESS: Yes. This is, because we're talking about territories.

THE COURT: And we're talking about the same space?

THE WITNESS: The exact same territory.

THE COURT: Like ospreys will come to the same nest, year after year, that kind of thing?

THE WITNESS: That would be fidelity. If it's the same -- well, if it's the same individual, it would be fidelity for that site, yes. And we know because of the banded cranes in the winter that the same individuals have maintained the same territory many years, in some cases decades.

MR. MUNDY: And what is site tenacity --

MR. FERNANDES: Excuse me. I'm sorry. Your Honor, I apologize, I didn't realize Mr. Stehn was in the room. We'd like to invoke the rule.

THE COURT: For all of everybody?

MR. FERNANDES: No, no, just for Mr. Stehn.

THE COURT: Just for Mr. Stehn? Now, why would that be? You've got all your experts here?

MR. FERNANDES: We have experts. He's not an expert in this. We don't have --

THE COURT: I thought we talked about designating him as an expert and paying him. You all said you would be glad to pay him.

MR. FERNANDES: We said we would be glad to pay him. That doesn't mean as an expert.

THE COURT: Well, why would you pay him otherwise?

MR. FERNANDES: Because, for his time and expense.

THE COURT: You get a witness fee, what, five dollars or something?

MR. FERNANDES: We -- that was not what we were saying, that we were going to agree to designate him as an expert.

MR. BLACKBURN: Well, we certainly think he's an expert and should be so designated, Your Honor.

THE COURT: I'm going to let him stay. Thank you.

MR. FERNANDES: All right. Thank you.

THE COURT: He's been here the whole morning, by the way.

MR. FERNANDES: It just was pointed out.

THE COURT: Okay.

BY MR. MUNDY:

Q. Explain what site tenacity is. Let's stick to the whooping cranes on the winter ground. What is site tenacity? How is that different than site fidelity?

A. When we're talking about migratory birds, we're talking

about fidelity, we're normally talking about birds returning to their same space year after year after year, whether it's a breeding grounds, wintering, in some cases, even the stop-over locations.

Tenacity would be the -- many birds who are not territorial would move around during the winter period, for example, and they would not be in one place during the entire winter. Whooping cranes stay in their territory the entire winter. That's tenacity. They're there the entire winter season, for the most part, I mean, minus a few forays into uplands and other places. So that, the fact that they maintain that space during one winter period is tenacity to that site.

Q. And what is the type of behaviors that would indicate site tenacity in whooping cranes on the winter, their winter territories?

A. Well, thanks to the aerial surveys that have been conducted over several decades, the presence of those birds in that space over and over and over again, and because they have been banded for many years as well, we know that it's the same individuals in the same place over time.

The fact that they're aggressive towards intruders obviously suggests high territoriality. Defensive resources is one of the indicators of territoriality and therefore tenacity to a site.

Q. When you say "intruders," you mean other whooping cranes?

They might allow, say, an ibis or a great egret in, but they will defend against other whooping crane family units?
A. That's correct. The whooping cranes are, would likely fly from one end of the territory to another, sometimes as much as a mile, if another whooping crane comes within the boundaries of their territory.

In the case of herons and ibis and other -- they might be aggressive towards them, only, but only within the space where they're at at that moment in time. They don't chase off every heron and egret that's in their territory at any point in time.
Q. Okay. And this behavior has been long, you've personally observed such behavior of the one crane family unit defending its territory against another crane family unit wandering in?
A. That's correct. I've seen it multiple times.
Q. Okay. And I'd like to go to Page 143 of Allen, if I can zoom up a bit. He describes at Page 143 an event of observation, "January 5, 1948, when the blue flowers of the salt-flat cranberry" -- that's what you say is now known as wolfberry?
A. That's correct, uh-huh.
Q. -- "were observed in bloom, the middle pond family was observed walking very close to the dike pair's kingdom. The dike pair walked toward them calling. The family retreated with dignity in silence toward the middle pond." What does that type of behavior indicate?

A. Territorial defense.
Q. Okay. And for what reason?
A. Well, it looks like the middle pond family was going beyond the boundaries of the territory into what he calls the dike pair's kingdom, which I'm assuming is his territory. And that's why they responded aggressively.
Q. And have you, yourself, observed family unit defense of food sources?
A. I wouldn't say food sources. I would say the territory boundaries.
Q. Okay.
A. Yes.
Q. Okay. The -- what is the average size of a family unit's territory?
A. Well, it's --
Q. On the winter ground.
A. Right. It's variable. At Aransas, it's about 110 hectares. On Matagorda and some of the other places, they're a little, they're bigger than that, mostly I think because of Aransas is basically entirely filled up, if we could say that, of space. And Matagorda and some of the other sites still have room for expansion, so territories are still larger in those areas.
Q. So you said the average on the refuge itself proper is 110 hectares. How does that translate into acres?

A. Well, you could kind of double it and it would be about the number of --
Q. Roughly double?
A. -- the number of acres.
Q. Okay. So roughly 200 acres is the average size on the refuge boundary proper?
A. Right.
Q. But Matagorda size, they increase in size?
A. Oh, yeah, three -- twice or up to three times bigger in some cases.
Q. So 2, 2 to 900 acres, depending on exactly where?
A. Correct.
Q. Okay. From your personal observations, if blue crabs are available, how do they -- what preference do the cranes give to seeking out crabs, if they're available over other food items?
A. Well, my, all my information suggests they prefer blue crabs to other food items. I mean, when we look at the information I collected, as for example habitat use patterns of whooping cranes, how many cranes are in open water versus vegetative flats, versus bays, et cetera. When they're in ponds, lakes, open water portions of the salt marsh, that's very likely more than 90 percent of the time they're searching for crabs. And the fact that the vast majority of the birds are in those environments through large portions of the winter suggests to me they're primarily searching for blue crabs.

So that plus direct observations of birds and what they're foraging on the vast majority of the time out there, looking at feces samples and how much they show up there, not just my own observations, but from many others in the past, I mean, it's pretty clear that blue crab is one food item that they seem to be going after.

And I think I mentioned this yesterday, I mean, I've seen cranes just walk around what appears to be under a loafing, a resting position, and they seem to see a crab, and I've seen them just run off and go get it. So --

Q. Chase it down?

A. So they have a response to crabs that's very, kind of predator/prey obvious relation, but they really seem to go after crabs for foraging.

Q. All right. Now, the suggestion has been made, well, insects are available in the marsh for them to eat, even if the crabs aren't. How much effort is required, from your analysis, for cranes to meet their energy and nutritional needs from capturing snails and insects as compared to crabs?

A. Well, one of the issues that I'm concerned when we're talking about other food organisms in the marsh, I personally sampled for snails, insects, clams, crabs, and other food items that I could detect in the marshes. Snails and insects are the least abundant of all the food resources that are documented out there. I mean, on my personal sampling scheme.

So if a crane had complete access to a barrel full of insects, it could probably fulfill its energy requirements easily. But the fact that I cannot find those organisms in the marsh in any abundance suggests to me that they're just not, even if they eat them, they're not going to find enough within their territory to fulfill their requirements during the winter, a winter period. I mean, there's just not enough there.

Q. We did the rough math yesterday of the whole crane flock is eating approximately 22,500 crabs per day. Assuming they have to eat, I don't know, was it at least 100 snails for one crab equivalent? A bunch?

A. Yes, a lot.

Q. How quickly would they exhaust the available snail population, as an example?

A. In one day.

Q. Not a viable alternative?

A. No, not at all. I mean, they could -- I mean, they obviously eat them. I mean, I've seen them eat them. They're reported in feces. But the abundance of those organisms in the marsh is just not sufficient to have enough of them for them.

Q. Okay. Same true for insects and all these other documented other items?

A. Well, insects even less so. I mean, there's probably less insects than snails in those salt marsh proper. There's a lot

in the uplands, but not in the salt marsh proper.

Q. All right. Every study you've ever seen, every published literature, did any of those indicate anything other than crabs and wolfberries or salt marsh cranberries that's known being the primary, the food of primary importance to the cranes?

A. Well, when you, if you break the winter up in, with a monthly, like we did with our feces samples, or in some cases like Hunt and Slack divided it in periods, early, mid and late, they're, if you break it up in smaller chunks of the winter, there are some periods of time where a particular food item that is not crab or wolfberry does show up in significant numbers.

There's been several of those that do show up. Clams is one of them, snails in some cases, insects in another. So there are -- but it's only for a short period of time. It's never been throughout an entire winter.

I have periods when there was a spike in utilization of clams, for example, during the period I was studying for my dissertation. There's a spike in insects as well. But it's only over a one-month period, for example, not an entire winter.

So over short periods of time, yes, there's other food items that show up and have shown up in different studies. But over an entire winter, there's nothing else that shows up over and over again like blue crab and wolfberry.

Q. If we wiped out blue crab and they were never available again to the cranes, what, from your own personal observations and research -- if we just took them off the table, the buffet line for the cranes, what impact would it have on the cranes overall?

A. I think the cranes would have to move somewhere else. I don't think there's enough food resources there, even if we had all that list that we have here, and based on the abundance of those other, even the rare ones, except fish maybe, although fish is such a rare item in their diet, that I don't think they could survive. They would either have to move or perish, I guess.

Q. And one of the problems with endangered species, they've not shown tendencies to move. They have niche habitats?

A. Well, high fidelity species, such as the whooping crane, have not shown any tendencies to move very far away. I mean, the reason the birds are so concentrated both on the breeding grounds and wintering grounds is because of that tenacity to its site and that fidelity for the population to return over and over to the same site.

Q. Not, it's not really a realistic expectation to say we could just pick them up and put them somewhere else?

A. We're trying. It's not working.

Q. Okay.

THE COURT: So they're really attached to this area?

THE WITNESS: Yes, ma'am. Very. I consider there's a -- because whooping cranes are what I call, they have a high culture inheritance. So the same bird will come back over and over again to the same place. And those that are parents will teach their offspring that same route and location, and the offspring then take up that pattern. So they --

THE COURT: So the chicks come with the parents in the flight?

THE WITNESS: That's correct.

THE COURT: Sometimes that doesn't happen.

THE WITNESS: It's very rare that that doesn't happen.

THE COURT: I meant not with whooping cranes, but with some other birds.

THE WITNESS: Oh, yes. Let's look, for example, peregrine falcons. The parents have a chick. Once it's fledged, the parents leave. And they literally leave the chicks, and they end up in Mexico, South America. The young birds then fly on their own the route that the population in general does.

THE COURT: Somehow it's imprinted.

THE WITNESS: Yes. They know how to do it. In the case of cranes, they have to learn it from their parents.

THE COURT: Okay.

THE WITNESS: Yes.

BY MR. MUNDY:

Q. What other behaviors do the chicks learn from their parents the year, their juvenile year on the winter grounds particularly?

A. Everything. I mean, I've seen, I've seen chicks not respond to low flying aircraft, for example, until the parents make, make sounds to put it in alert. So it obviously hasn't recognized that particular noise or object as a potential predator until the parents identified it for them.

Feeding, locations, capture of food, particularly crabs that are, can be aggressive sometimes, are things that they have to learn. I mean, in captive flocks, when introduce a novel food item that the cranes are not used to, they have to teach them that it is food. I mean, they don't just automatically, for the most part, take on new, novel sources without knowing anything about it.

Q. The winter of '08 -- well, explain what the term "food stress" is, first.

A. Well, in general, like when we're talking about food stress in wild populations, it's the inability of the organism or population to acquire sufficient resources for survival against -- in common terminology, I guess you could call it birds in near starvation, in a sense.

Q. All right. And --

A. The reason we call it food stress is because when we study

a wild population, we normally can't go and do a physical health check of individuals. That's pretty rare, unless we're trapping them for other purposes. So you don't normally go out and look at condition unless the bird has died or something happened to it.

So we can't say, by looking at a bird or a population, that they're starving. But what we can say is food availability is low. Their capture rates are low or their success in capture is low. That means they're not acquiring sufficient resources to maintain or store energy reserves.

Q. All right. And did you see indications of food stress in the juveniles in the winter of '08-'09? Or was it described by others and documented in the winter of '08-'09?

A. I can't say that I, as far as juveniles go, that I could look at juveniles and determine they were food stress. I cannot say that I did --

Q. From when you were there?

A. Right. I mean, I saw indications of juveniles behaving in ways that were not normal, which suggested to me that the parents were food stress.

Q. Okay. What are those?

A. Well, the fact that I observed, for example, something I had never seen before, was a parent collecting a crab and proceeding to eat it, and a chick coming to try to share, which is what they normally do, and the parent aggressively pushing

it away from the food source.
Q. What would normally happen?
A. Well, the crane could either just leave the crab for the chick, for example, or break it up, and when they first get here, sometimes feed it to the chick. As they get, as the winter progresses, they literally just pull crabs out of the water, kill them, and then leave them for the chick to eat. That's common. That's regular. What I observed was the parent being aggressive towards the chick, which I had never seen before.
Q. Denying food in response to begging?
A. That's right.
Q. The, did you ever see parents denying food in response to begging from a child during the '93-'94, or the two years you did your field observations?
A. No. I had never seen that behavior before. This is the one and only time that I've seen it is during that winter.
Q. What is, what is -- we're going to talk about something known as delayed molting. What is delayed molting in juvenile whooping cranes on the winter grounds? Explain that concept before I show some photos.
A. Well, some of the studies that have been conducted suggest there's a very regular pattern of timing of feather replacement from what is the chick, the chick feathers, the brownish, rusty coloration that we've seen in some pictures, into the white

feathers that become the subadults. So delayed molting would be a slowing down perhaps of the feather replacement at a slower rate than had happened in the past or one bird compared to another bird, for example.

Q. Okay. And we saw examples yesterday of the young birds with the very dark heads, the cinnamon feathers. When do they start normally replacing those or losing those?

A. Well, they start almost immediately. It just takes -- when they get here, they already have some white feathers. They're, I mean, they're already started to replace their chick feathers with white. It just, it goes on throughout the entire winter, and the last ones to be replaced are head and neck. So by the time they leave, sometimes some birds have very little rusty, a little sometimes over the, like the wing coverts, probably seems to be the last ones to be replaced, and then the head and upper neck appear to be some of the last ones. When they leave, at least Aransas in the springtime, some of them still have brown heads or turning white at that time.

Q. Who is Diane Lloyd?

A. Diane Lloyd is a photographer from Rockport.

Q. And is she -- explain how you know her.

A. Well, I've met her in, I guess in some of the crane or bird festivals that have happened in either Rockport or Port Aransas, and I just happened to visit with her one time, because she has a lot of pictures of whooping cranes in

general, and other coastal birds. She's a photographer primarily focused on birds of the coastal areas.

Q. And, well-known -- is she amateur or professional photographer?

A. Well, I think she's somewhere in between.

Q. Sort of semi-pro?

A. She has a studio that she sells a lot of her pictures, and so I guess she's a professional. I mean --

Q. Okay. But somebody that's known in the Rockport area that you personally have known, among other things, takes a lot of photos of whooping cranes?

A. That's correct, yes.

Q. And Defendant's Exhibit 197, we see a series of e-mail exchange. Is that your e-mail address?

A. Yes.

Q. GURULO02 (phonetic)?

A. That's correct.

Q. And you say, "Hi, Diane. This is Felipe Chavez from the Whooping Crane Trust. I hope you're doing well. We have not communicated in a while."

THE COURT: Could you move it over a little bit?

THE WITNESS: To the left.

BY MR. MUNDY:

Q. Let me zoom out just a bit. "I was hoping you could help with an issue I'm trying to help Aransas with." And the date

of this is what, sir?
A. I'm sorry, what date?
Q. Yes, sir, the date of your initial e-mail.
A. March 25, 2009.
Q. And so this is, you made the field visit, and approximately a month later you're still working on it, trying to help -- you're back at Platte River, or wherever?
A. Actually, when I sent this e-mail, I was in Baja California.
Q. Okay. But you were still continuing to help or attempt to help with the situation of the '08-'09 winter?
A. Well, what happened at that time is I had received pictures from the refuge of the birds that were coming to feeders. At the time I was at the refuge itself, this idea of delayed molting had not hit me really until I looked at a lot of pictures repetitively, for the certain dates, and that's when I decided to compare to other years.
Q. All right. And we have the -- you're talking about the game camera photos?
A. Correct.
Q. These were --
A. I think some were shown last, yesterday.
Q. Yeah. We have a series of them here. Defendant's Exhibit 194 --
A. Ooh, that's bad.

Q. It's not very good. Is that --

(Counsel conferring off the record.)

BY MR. MUNDY:

Q. That's Page 321. Ah, much better.

A. Yeah.

Q. The, we see the game camera stamp down here. Explain what we're seeing. Well, actually, for the record, what's the date of the game camera time stamp?

A. March 11, 2009.

Q. Tell me what you're seeing here and --

A. Well, this is a juvenile bird walking around one of the feeders they had at that time at Aransas. You can see obviously a juvenile because of the rusty coloration I mentioned on some of the feather coverts, the tail and the head primarily in this case.

Q. Do you still have your pointer up there?

A. I do.

Q. We all understand "head." What's "covert"?

A. Okay. Coverts are the short feathers that are at the leading edge of the wing that cover the base of the long flight feathers. So those are the coverts. The tail is very rusty. And of course the head and neck.

Q. Let's go to Page 325. This is time stamped again. Let's see, this one's March 13, '09.

THE COURT: What is that --

THE WITNESS: Correct.

THE COURT: 325, is that an exhibit number?

MR. MUNDY: The page, the Defendants offered one large exhibit --

THE COURT: 197, okay. And this is --

MR. MUNDY: 194, Your Honor. It's one large series of photographs.

THE COURT: I'm sorry, 197 was the e-mail --

MR. MUNDY: Right.

THE COURT: -- from Dr. Chavez-Ramirez to Diane Lloyd.

MR. MUNDY: Correct. And he was saying there was this series of game camera photos that triggered him to write her --

THE COURT: Sorry.

MR. MUNDY: -- for comparison photos. And just to give you a road map, in a moment we're going to see her photos from an earlier year for comparison's sake.

THE COURT: Okay.

MR. MUNDY: But these are the photos that triggered the e-mail by his testimony.

THE COURT: And these were taken when?

THE WITNESS: This one in particular says March 13th, 2009. They're all slightly different dates, Your Honor, if I remember.

THE COURT: Thank you.
BY MR. MUNDY:
Q. Next is Page 325.
A. Yeah, this one's really bad. Obviously you can't, obviously you can tell the head is dark, but that's about it at this point.
MR. MUNDY: Go to Page 325, Mr. Waites, please. Oh, excuse me, 352 would be the next one.
BY MR. MUNDY:
Q. Okay. Tell us what we're seeing here. This is -- what's the date of --
A. This is March 20, 2009. Again, the head brownish. You see that line of coverts, wing coverts. You can't really tell what the tail is like in this case. But the head, very clear, very uniformly rusty at this point in time. And the neck, all the way down to about halfway is still in the rusty coloration.
THE COURT: Oh, the juvenile's on the right?
THE WITNESS: Yes, ma'am.
THE COURT: Okay.
BY MR. MUNDY:
Q. And this would be just following its parent on the left?
A. Yeah, if I saw this in the wild, I would have to assume this is a parent and that's an offspring.
Q. All right.
MR. MUNDY: And then next, Page 370, Mr. Waites.

THE WITNESS: This is from 3/21 or March 21, 2009. And I don't know if it's the same bird or not, but again, we see the rusty upper neck and head, coverts, this one. And the tail, you can tell in this one the tail was still rusty in some parts.

BY MR. MUNDY:

Q. And there were many more of these game camera photo series sent to you?

A. Yes.

Q. And who sent those to you?

A. I'm not exactly sure, but it says from the Aransas National Wildlife Refuge.

Q. Okay.

A. I don't know if Tom or one of the other people there.

Q. All right. And, but again, going --

MR. MUNDY: If we can go back to the ELMO, Your Honor.

THE COURT: Do you want to put it back to the ELMO?

MR. MUNDY: Please. Thank you.

BY MR. MUNDY:

Q. So that the series of the game camera photos sent to you is what triggered you -- well, explain again, what about those game camera photos caused you to contact Ms. Lloyd?

A. Well, I had, obviously I have seen a lot of juvenile birds over different times of the winter period. The fact that I was

only there for a snapshot of time, and after looking at the pictures for about the same time period and later that I was there, just had a nagging feeling that they were just a little darker than what I could recall. And I wanted some pictures from the same general time period from other years, just to compare. And at that time I wasn't sure that I had anything going on there.

Q. All right. And so let's, just to complete the e-mail, "I am looking for pictures of juvenile birds taken in February and March of previous years. I do not know if you can know the exact dates of some of your pictures, but if it would be possible, send some copies so I can compare this to this year's birds. It would help us better understand the condition of the birds this year. I'm currently" -- there you go -- "I'm traveling in Baja, so use my back-up e-mail. Best, Felipe."

And then we have, we show on the series here, it has the image attachment, she's noted from her March of 2007. Was 2007 -- well, it's obvious. We'll just skip it. But anyway, so here's her photo. How does that bird --

MR. MUNDY: Can you pull that up, Mr. Waites, on yours?

THE COURT: Could you do the contrast a little bit better?

MR. MUNDY: I think Mr. Waites can pull it on his. 197, the photo attachment.

MR. WAITES: He has it.

MR. MUNDY: There we go.

BY MR. MUNDY:

Q. How does that bird compare with what we just saw of those game camera photos? What's important to you about that?

A. Well, if you look at the head, there's quite a, there's a lot of white on part of the neck and the head.

THE COURT: What about the beak?

THE WITNESS: I'm sorry?

THE COURT: Compare the beaks. Is there a difference?

THE WITNESS: The beak changes color as they mature, but I can't tell --

THE COURT: So they get longer and stronger, didn't somebody say earlier?

THE WITNESS: Oh, yes. Yes.

THE COURT: Is this a better looking beak than the other one?

THE WITNESS: I couldn't say, Your Honor. I mean --

THE COURT: Can you show both of them?

THE WITNESS: Personally —

MR. MUNDY: Let's see. I may --

THE COURT: I'm just curious. It may not have anything to do with anything.

MR. MUNDY: Let me, I can just hand him a series of

photos, and we can leave this one on the monitor.

THE COURT: You can do side by side beaks.

MR. MUNDY: If we go to the ELMO, we can.

MR. WAITES: Your Honor --

MR. MUNDY: But this one doesn't display very well on the ELMO.

THE COURT: He's trying to tell you something.

MR. WAITES: I can --

MR. MUNDY: Oh, you can stack them up? Okay.

MR. WAITES: If you tell me which two.

BY MR. MUNDY:

Q. Dr. Chavez, if you think there's one that --

A. I think 394 is the best shot of a beak of the ones I have here.

Q. While he's looking for that, to you, what is the most -- oh, there we go. Compare these two. This is the game camera photo from --

THE COURT: I can't see that very well, the left one.

THE WITNESS: Yeah, you got to zoom in on the beak, on the head, I guess, because the beak is not -- unfortunately, those pictures of those cams don't have good beak shots. So this is not even --

THE COURT: I don't think that's going to be helpful.

THE WITNESS: This is not even very good.

MR. MUNDY: Well, before we --

THE COURT: Never mind.

BY MR. MUNDY:

Q. Before we lose this, though, you see this is from the game camera March '09 photo. But explain this, the uniform brown still remaining, versus -- can you go back to the other, the '07, March '07, pull this up? How -- this is what you're describing?

A. Well, yes. Right. If you look at that portion and some of the neck area up here is starting to change to white, compared to the previous picture. But quite a large percentage, obviously.

Q. Okay.

THE COURT: Can you do that with the beak of the other one, or is that possible?

THE WITNESS: It seems to be a fuzzy picture. The beak of the other.

MR. MUNDY: I think it's a difference of professional photographer versus game camera at work on this.

THE WITNESS: Yeah, it's --

THE COURT: Never mind.

THE WITNESS: -- bad quality.

THE COURT: Is it, I just -- maybe it's not clear, but that one looks thinner than the other one, the beak.

THE WITNESS: I think the head is turned slightly, ma'am.

THE COURT: Okay.
THE WITNESS: So it could also be that.
THE COURT: Never mind. Have you got any other beak pictures from '09?
THE WITNESS: I don't know. I don't think so. Because all these are automatic cameras taking pictures.
THE COURT: Okay.
THE WITNESS: Not people out there.
BY MR. MUNDY:
Q. These, these are not high tech sophisticated, these are like the things deer hunters buy at Academy or --
A. That's correct. And I can't remember if it was five mega pixels --
THE COURT: Motion pictures kind of thing?
THE WITNESS: No. These are still shots. They're just single shot.
THE COURT: No, I meant, is it activated by the motion of the animals?
THE WITNESS: Oh, yes. Yes.
THE COURT: Okay.
THE WITNESS: That's right.
MR. MUNDY: If you would, pull up Exhibit 198, the photo, Mr. Waites. If you want to leave the one, the image on the left up, if it's possible.
MR. WAITES: Leave the left, replace the right?

MR. MUNDY: Correct.
BY MR. MUNDY:
Q. Okay. Again, comparing the '07, tell us the differences or distinctions you see, '07, excuse me, '07, Ms. Lloyd's photo, versus the March '09 photo, game camera photo.
A. Right. Well, to me again it's the head, look at the white patch on the, like would be a, kind of a cheek area, the side of the neck, compared to this one. This one has, to me, based on what I've observed, the wing coverts begin to turn white from back to front. So to me, these wing coverts in the back appear to be changing a lot more than the ones on the '08-'09 bird.
MR. MUNDY: All right. If we can -- Mr. Waites, let's go to Exhibit 196.
MR. WAITES: PX?
MR. MUNDY: Yes. Let's go ahead and drop the two off so we can get larger pictures, please. DX 196 photos.
MR. WAITES: DX?
MR. MUNDY: Yes.
MR. WAITES: I'm sorry. Just the photo?
MR. MUNDY: Correct.
BY MR. MUNDY:
Q. All right. Another of Ms. Lloyd's March '07 photos. Explain what we see here and how that contrasts with that series of game camera photos from March '09?

A. Well, this one's even more striking in the amount of white on the upper neck. The '08-'09 birds seem to have a lot of brown still in the upper neck. This one clearly is very quickly shifting to white, the white patch. I mentioned before -- and unfortunately, I can't tell very well what the covert situation might be here --

Q. All right. And if you would go last to DX 195 --

A. What I guess, just going back to --

Q. I'm sorry.

A. -- to Your Honor's kind of comment, this one looks like a full grown beak now, an adult shape and form.

Q. All right. And compared to the game camera series that you saw looking at the whole series of them, does this one show noticeable developmental differences versus the March 2009?

THE COURT: What year is that one again?

MR. MUNDY: March of 2007.

THE COURT: '07?

THE WITNESS: Are you talking about the beak?

BY MR. MUNDY:

Q. The beak, and if you notice any other structural difference.

A. I think the beak pictures from the game cams to me are, I can't --

Q. Too murky?

A. I wouldn't go there. I mean, I couldn't do it.

Q. There's just --
A. I can't tell.
Q. -- not enough resolution?
A. Right.
Q. Okay. Let's last go to DX 195, which is a flight photo from March 2007, Ms. Lloyd. Explain to us what we see here and how that contrasts with the game camera series?
THE COURT: What number -- what exhibit is this?
MR. MUNDY: 195.
THE COURT: Thank you.
BY MR. MUNDY:
Q. This is another of Ms. Lloyd's 2007, March 2007 series.
A. Right. Well, I mean, clearly the white patch is obvious, like the other birds. Unfortunately, because it's in a different position, the coverts are now in a completely different arrangement, which would be around here. So it would be hard for me to say that this is different than some of the others, because of the position this bird is now. The head, however, is clearly, has much more white than the '08-'09 birds.
Q. Is there a difference in the facial skin of the kind of iconic facial patterns as they change, or not so much as just the result of the whiter feathers not --
A. It does. It gets darker. But again, the game cam cameras are not, they're kind of fuzzy, so it would be hard to say

that that --
Q. All right.
A. -- is also change. I don't know.
Q. All right. When you looked at the difference in this series of photos Ms. Lloyd sent you from March of 2007, compared to the March 2009 game camera series from the refuge they had sent you, what did -- what impression did that make on you?
A. Well, that the feather replacement that was going on on the '09 birds was slower at least than the pictures that I received from Ms. Lloyd.
Q. Okay. And what does that indicate to you?
A. Well, feather growth in birds is a very energy expensive activity. So the fact that -- and we know, we know, because there are several studies, there's even a whole field of ornithology called title chronology. We know that feathers grow in 24-hour periods. And they generate bars on the feather that you can actually measure, kind of like tree rings on a stump. And birds that are in good, or have enough food and are in good body condition have feather growth at a considerably higher rate than birds that are food stressed. So the fact that, you know, feathers grow more and quicker under good food conditions, and they grow less and at slower rates when there's decreased food availability.
Q. Now, the denial of the -- the parents' denial of food to

the chicks in response to begging behavior, the delayed molt in the juveniles, you've discussed your evidence in your opinion of food stress -- well, I guess the way you said, actually more accurately was food stress on the adults, but how dependent are the chicks on the adults for supplying their own food?

A. Well, early in the winter, they're extremely reliant on them. Obviously, they become more and more independent as the winter progresses, so I would expect chicks early on would have a much harder time procuring resources on their own than chicks that are later in the winter time. But I think, to me, these are indicators of food stress, obviously. But the clearest, the clearest reason, what I would think is food stress, based on just these points, is the mortality that occurred.

Q. Okay.

A. And the fact that the vast majority of that mortality was juveniles suggests that.

Q. Okay. Lack of food?

A. Right.

Q. How does lack of adequate food affect the behavior of the cranes with respect to their territories, staying within their territories, feeding within territories?

A. Well, as Tom reported, for that winter, there was a lot of movement away from territories, obviously. So, I mean, if you had all the food you needed in your territory, you wouldn't have to leave, unless you were going to go drink fresh water

because of high salinities. But the fact that you were constantly moving away from your territory, which you established over several years to protect your food resources, suggests that the food resource is no longer suitable.

Q. How does disturbance of the usual behavioral pattern, when you start having to move, or they start having to move out of their territories more, more frequently seeking out food sources, how does that increase risk to the birds?

A. Well, as we saw in some of the pictures from the salt marsh, I think the salt marsh is a very safe place for cranes, for several reasons. The predators that are present in that area are rare in the salt marsh. The fact that there's so much open water and short vegetation means a bobcat is unlikely to sneak on a whooping crane, just because he would have to run through water to get to them obviously.

So the uplands are a completely different story. There's a lot of places for predators to hide. There's more of them. So there's the potential for something to happen to the birds when they're off the salt marsh, and particularly in the uplands. The bays are obviously wide open, not much. But when they're in the upland portion, that's where predation would likely increase.

Q. Now, the Defendants have repeatedly pointed out there are, quote, only four carcasses recovered of the whooping cranes that winter. Can you think of any other year in which four

carcasses have ever been recovered?
A. I don't know of any other year. I think there's been less than 20 carcasses found over the entire period that we know of in Aransas. So four is quite a considerable number for a single winter time, winter period.
THE COURT: When you say over the entire period as the measure, is that 21-year period of measurement, is that what you're talking about?
THE WITNESS: No, I'm talking about since the refuge was established basically in 1938.
MR. MUNDY: The --
THE COURT: And that includes these four?
THE WITNESS: Yes.
BY MR. MUNDY:
Q. From your personal time out in the field, what are scavengers and predators present in the refuge that would eat a carcass?
A. Black vultures, turkey vultures, caracaras are obviously the major scavengers. Of course, raccoons, skunks, foxes, coyotes, alligators, gulls --
Q. Okay.
A. -- feral cats.
Q. Hogs?
A. Hogs, yes, of course.
Q. Now, great egrets are present year round. They're a

permanent resident in the refuge?
A. That's correct.
Q. How many great egret carcasses have you ever personally laid eyes on in the refuge out doing your 300 days of field work and more beyond that?
A. Well, I would say herons instead of great egrets in general.
Q. Okay.
A. Because I can't, some of them, some of the -- I've found some carcasses that were just bones, so I couldn't tell the feather coloration, so, but I'd say ten to twelve carcasses --
Q. Of the whole egret --
A. -- of different herons, yeah.
Q. Lumping the whole family together?
A. Yes.
Q. How about snowy egrets? I mean, I guess that's within that whole --
A. No, that's smaller, so I don't think -- I can't be sure that I've -- well, no, I did find one, because the feet was yellow, so that would have been at least one.
Q. One?
A. Right.
Q. And how many are present, in rough numbers, out in that refuge?
A. At least hundreds, if not thousands.

Q. Okay. And you've only found one of those. And they're there year round?
A. Yes.
THE COURT: And the herons, there are probably hundreds of thousands of those, too?
THE WITNESS: Hundreds to thousands. I wouldn't say hundred thousand, but --
THE COURT: Thousands.
THE WITNESS: -- I've personally counted over 300 in one flight. And that was only during a small transit. So there --
THE COURT: So you would say thousands, not just hundreds.
THE WITNESS: I would say thousands, yes, thousands.
BY MR. MUNDY:
Q. The percentage of carcasses recovered, as compared to the number of bird population present, strikingly high number of carcass recoveries in a single year for a single species of bird, from your own personal experience?
A. Are we talking about whooping cranes?
Q. For the whooping cranes.
A. Yes.
Q. And it's a much higher percentage of carcass recovery, as compared to the whole population than from all the other types of bird carcasses you've seen out there?

A. Probably.
Q. More than, it's more than one percent.
A. Yes, right.
Q. Let's change gears for a few minutes and talk water, for how the cranes utilize water now. All right?
A. Sure.
Q. When you were doing your field work, the 300 days and more, besides the observation, behavioral observations you've described, explain what observation you would routinely and typically do with respect to water salinity.
A. Well, every time I sample for blue crabs, I would measure salinities.
Q. Okay.
A. Sometimes when I was going, doing wolfberries, occasionally would also do salinity measurements. So pretty regularly.
Q. All right. And --
THE COURT: Now, we're only talking about in his two-year work for the field work for the dissertation?
BY MR. MUNDY:
Q. Did you measure salinities beyond your time doing the dissertation field work?
A. I have, yes.
Q. Okay. The, if you would, this truly is a demonstrative, just to show Your Honor how it's measured, but if you would,

show Judge Jack the instrument that you use, what that is, what it's called and how you use it.

A. Well, it's called a refractometer, and it's to measure --

THE COURT: A what?

THE WITNESS: Refractometer.

THE COURT: How do you spell it?

MR. MUNDY: Good question.

THE WITNESS: Re, R-E-F-R-A-T-O-M-E --

THE COURT: E-T-E-R?

MR. MUNDY: Refractometer?

THE WITNESS: Right.

THE COURT: Oh, it has a C, refractometer?

THE WITNESS: Yes.

THE COURT: Thank you.

BY MR. MUNDY:

Q. Works by refraction, is why they call it this?

A. Right. This measures the amount of, the salinity in parts per thousand of water. And what we do is we put a sample of water --

Q. Sir, you may have to stand up to. I don't think she can see through that. You may have to show her.

A. So we put water here and cover it up, and then you can, you read, and there's a graduation inside, and there's a blue line that moves up and down depending on the salinity level. So wherever the blue line is, is where is the measure of

salinity in parts per thousand of the water sample that has been put through.

THE COURT: Thank you.

MR. MUNDY: And that --

THE COURT: He talks louder when he stands up. Should I make him stand up?

MR. MUNDY: You might. I know.

BY MR. MUNDY:

Q. Let's go ahead and put that away. But that's a very commonly used tool, one you just carry with you to measure the water salinity?

A. Yes, I carried one of these in my vest when I was out in the field all the time.

Q. All right. And last, tell the Judge what we did last night with a bottle of water. I was going to pour you a little bit of salt water. But then I know your rules on pouring water, and we're not doing it. But if you could, just explain --

A. What we did?

Q. Explain to the Court, if you take a one liter bottle of water, and what you did about pouring Whataburger packets of salt and how many packets equaled what's known in measurements of parts per thousand.

A. Right. So, so in that liter of water, we, we mixed in 15 packets of salt as the ones you would get at Whataburger, so

everybody knows what that's like. And we made sure it was mixed in, then measured with the refractometer the parts per thousand of salinity in that liter, and it was 13 parts per thousand.

Q. How many?

A. 13.

Q. 13?

A. Parts per thousand.

THE COURT: What's the ocean usually?

THE WITNESS: 35, 36.

THE COURT: 36 parts per thousand?

THE WITNESS: Uh-huh.

BY MR. MUNDY:

Q. And just while we're on the subject, to kind of go to the end game, what's the high salinities that you've reported inside the bay?

A. That I personally recorded?

Q. Yes, sir.

A. I think that the highest I ever recorded was about 42.

Q. So the bay salinity was higher than the open ocean?

A. Oh, I'm sorry. No, this was not the bay salinity. This was the marsh, the marsh salinity.

Q. Marsh salinity, fair enough.

A. I was not measuring the bay salinity personally.

Q. Correct.

A. Most of the time.
Q. Excuse me. I misstated that. The salinity within the marsh, the highest you detected yourself was what, sir?
A. 42.
Q. Parts per thousand?
A. Correct.
Q. So the marsh, from your own personal detection, was above open ocean salinity?
A. That's correct.
THE COURT: So when was that?
THE WITNESS: I'd have to look at my notes, but I mean, I've sampled not just during my dissertation but several years after, because I had students working there, so I can't tell you exactly what, without going through my notes, when that was. But I know that this year, even though I did not measure it myself, personnel with Aransas Refuge have recorded salinities of 42 parts per thousand while we were trapping last week, and they report a 47 parts per thousand several weeks before that.
BY MR. MUNDY:
Q. Of the marsh water?
A. Marsh, yes.
Q. Now --
THE COURT: Now, is that -- it seems a bit unusual.
THE WITNESS: It's very high, yes. But because it's

a drought --

THE COURT: It's a drought year.

THE WITNESS: -- and there hasn't been any rain in a while -- well, we had some rain in the last few days, but that, you would expect salinities to continue to increase, yes.

THE COURT: Are they in danger this year, in your opinion?

THE WITNESS: Based on the number of birds that I've seen come to our trapping sites, which are fresh water ponds, yes. I mean, I've seen as many as 24 birds before 9:00 a.m. coming to drink water at some of our trapping sites.

BY MR. MUNDY:

Q. And we're going to explore for a moment what your observations were in the field doing the field work during your dissertation period. But when you were recording salinity in the marsh water, I want to stick to the marsh water right now, what was your finding about at what level the cranes would drink the marsh water and at what point you would see them to stop drinking the marsh water and go seek the water from the inland like stock tank sources?

A. Well, I have to say that during my dissertation period I was not out to look at what salinity cranes drink and when. That was not my goal, and never was. I was measuring salinities as part of my sampling for the food resource, primarily blue crab, because I had read that salinity was very

important.

But I collected a lot of salinity measurements over many days and over many winters. When I look at the pattern of when I saw cranes going to uplands to drink water, over time I realized that there was a certain threshold, to me, at about 15 parts per thousand, when birds would begin to go to fresh water. And over time, I think anywhere between 15 and 18, to me, birds are definitely going to drink water. Anything higher than 20, everybody goes to drink water.

Q. So if the salinity was below approximately 15 parts per thousand, where did they drink their water from in that scenario typically?

A. They drink water from their salt marsh territories.

Q. Okay. From their home, their home territory?

A. Correct. They don't have to move, because I mean, they walk in that water daily. When it's below 15 parts, they just drink that water.

Q. Okay. And I guess, do they, did you see individual preferences? Like you know people have preference how much salt they like on their hamburger or french fries, some like a little, some like a lot, and at some point no one likes it. But did you see similar type of preference among the family units, or is it 15 parts per thousand and they all leave at once?

A. No, I can't say that. I mean, what I've seen is that at

15 parts per thousand, I could detect some birds in fresh water ponds. I couldn't say there was more or less, just that some were clearly going to fresh water. When it was getting closer to 20, a lot of birds were leaving the marsh to go to fresh water.

The one thing I could not tell you is when I measured salinity, I wasn't measured salinity over the entire refuge.

Q. Uh-huh.

A. So it's possible the salinity differences of 2 to 5 parts per thousand could exist between different territories in different portions of the refuge. So it's very possible when I measure 15 in an area, it was still 12 in some other territories. So I can't say for a fact that I know that some birds move at 15 and others do not.

Q. But from the pairs you observed and the measurements you took and the observations you made, what was the correlation that you observed?

A. At 15, some birds go to fresh water. Above 20, just about every bird goes to fresh water at some point during the day.

Q. Okay. How long do they stay? We saw the example of the birds at the stock tank. How long do they typically stay at the stock tank to drink water?

A. The vast majority of the time, it takes them about -- they're very wary when they get there. And maybe we saw these, if not, I can't remember in the video yesterday, but they walk

around in alert behavior, very -- for a few minutes, maybe a minute or two. Then they go to fresh water -- then they go to the water, drink and leave. So I'd say most birds are gone within five to ten minutes.

Q. Do their business, drink their water, and go back to their territory?

A. Correct.

Q. Now, as part of your observations, you've said you were doing the field work and making notes about crabs and how many crabs in abundance and availability to the cranes?

A. That's correct.

Q. Did you see any correlation between, just from your observations, the presence and availability and abundance of crabs with salinity?

A. You know, I can't really say that I did.

Q. Okay.

A. Based on, because I was measuring abundance of crabs based on crab trapping.

Q. Uh-huh.

A. So the number of crabs that I got in a trap --

Q. Okay.

A. -- over a line, so ten traps. And I can't say that I could tell significant differences with my measurements of salinity --

Q. Okay.

A. -- and my crab traps.
Q. Now, would that be fair to have the Defendants say, well, that means there is no correlation? Is that what your work indicates on that?
A. No.
Q. Okay.
A. I didn't even try to do that, no.
Q. Okay, it just --
A. That wasn't -- that wasn't part of my objectives, no.
Q. The way those, the way that measurement was set up wasn't done in a way that would allow a conclusion one way or the other way, as I --
A. Not my information, no.
Q. Okay. And as I understand it, in 2003, you attempted or began an analysis looking, or attempting to look at like what Mr. Sass, or Doctors Sass and Ensor did yesterday, approximately that type of -- you started looking at that relationship?
A. Well, of course. We're, you know, as part of our discussions on the Recovery Team about fresh water inflows, crabs, you know, there's some people have brought up over and over again the crabs are declining, not just in Aransas, but you know, all over the place. So obviously that concern was there.
And what I did was do a very quick exploratory analysis

for a presentation that I gave at the North America Crane Workshop, where I basically took a yearly harvest of crabs, the Texas Parks and Wildlife data that when they survey for crabs in the bays, for small crabs and large crabs and different portions, and looked at fresh water inflows at San Antonio Bay, and just did a quick correlation to see if whooping crane mortality was correlated to some of those factors.

Q. Okay. Now, did you use the statistical tools and methods that Doctors Ensor and Sass brought to the table?

A. Oh, no. I did something much more simple than that.

Q. Okay.

A. It was, like I said, it was exploratory. My goal at that time was to try to use that presentation to try to then -- try to define some research to try to get better data to try to relate those things in a more direct fashion.

Q. To get people like Dr. Sass and Ensor to do the work?

A. Right.

Q. Would it be -- and you came to a -- you could not reach a conclusion, based on your preliminary work?

A. Well, there was a few variables that were kind of, had high correlations, but because there, what I was correlating was huge data sets from different agencies and organizations. I cannot specifically say what the connections are in a biological sense, for the most part, except that there's, some variables were correlated with each other.

Q. And let me assure you, this is in no way a negative comment towards you, but you don't have the training and field of expertise in methods that Sass and Ensor brought to the table?
A. I'm not a statistician like Dr. Ensor, no.
Q. Okay. Would you defer to them on that statistical and correlative analysis on cause and effect?
A. Oh, most definitely. I always search the assistance of statisticians to look at my data.
Q. Okay. And, but this is an issue that the Recovery Team's been looking into for at least a decade or so now?
A. Well, at least a decade, I would think.
Q. Okay. And I won't replow the ground that was gone over with Mr., or Dr. Archibald yesterday, but the 2007 Recovery Plan, you were in the room when it was shown to the Judge. The year before the Recovery Team was already discussing the importance of inflows. Right?
A. Correct.
Q. So it's been a concern long, or it's been a concern before this event in 2008 or '09?
A. It was within the Recovery Team, yes.
Q. Okay.
MR. MUNDY: Give me just a moment, Your Honor. I'm trying to make sure I don't duplicate things that have already been discussed with Dr. Archibald.

BY MR. MUNDY:

Q. Going back to the parents denying food to the juvenile birds, how dramatic, or how important is the impact of that on the juvenile bird?

A. Well, depending on the degree of, I guess knowledge that the chick has, or the juvenile has acquired in the time period, whether he can be independent in capturing food or not, I would say it would, could be lethal in some cases. The chick that in normal years would depend for months on their parents, and then all of a sudden not have that support, I would think it could be very dangerous.

Q. Right. Now, the years you were out there doing the field work for your dissertation, did you ever observe a isolated solitary juvenile bird?

A. I did during the winter of '93-'94.

Q. And --

A. That, that was the only time I had observed that before --

Q. Okay.

A. -- '08-'09, myself.

Q. And was that the good year or bad year?

A. That was the bad year.

Q. Okay. And when the -- were there observations of isolated solitary juveniles in '08-'09?

A. Yes. I personally saw some isolated juveniles, and Tom reports quite a few actually sightings of those.

Q. So '93-'94, you saw it one time?
A. Personally, yes.
Q. Okay. And that was considered by your definitions a, quote, bad year?
A. Correct.
Q. Okay. '08-'09 multiple reports --
A. Correct.
Q. -- of the isolated solitary juvenile?
A. Correct.
MR. MUNDY: I think that's all I have at this time, Your Honor. Pass the witness.
THE COURT: Thank you. Mr. Fernandes.
(PAUSE.)
THE COURT: Mr. Fernandes, is that your water on there?
MR. FERNANDES: I'm sorry?
THE COURT: Is that your water?
MR. MUNDY: That's mine, Your Honor.
THE COURT: Okay. I thought you -- I just wanted to make sure.

CROSS-EXAMINATION

BY MR. FERNANDES:
Q. Good morning, sir.
A. Good morning.
Q. What I'm going to do is let's start talking about a few of

the observations this morning of some of the photos that you showed from those aerial surveys. Are you with me?
A. Sure.
Q. Now, those -- first of all, just so we're real clear, you have flown with Mr. Stehn approximately 30 times, but you did not fly with him during the winter of 2008-2009, did you?
A. That's correct.
Q. And those pictures that we were seeing were not from the aerial surveys that were conducted during the year '08-'09, were they?
A. No, they were either '92-'93 or '93-'94, as far as I know.
THE COURT: I'm sorry. What?
THE WITNESS: Either '92-'93 or '93-'94. I don't know the exact dates.
THE COURT: Thank you.
BY MR. FERNANDES:
Q. And when you were flying back in '92 and '93 and '94, there were a lot of low passes being made to read color bands on those cranes. Correct?
A. Yes.
Q. But by the time we got to '08-'09, there were relatively few low passes being made to read color bands, because there were no color bands. Correct?
A. I don't know that for a fact.
Q. Let's look at DX Exhibit 123.

THE COURT: Is it switched on? Okay.

BY MR. FERNANDES:

Q. Have you seen this article that Mr. Stehn wrote with Mr. Taylor that describes his aerial survey techniques and methodology?

A. Yes.

Q. Okay. And if we could turn to Page 150, please. Right above Recommendations. Do you see there where it says, this is in 2008, this is before the winter of '08-'09, "With only 11.5 percent of the population currently banded, and the percentage of banded cranes continuing to decline over time, fewer low passes are made each winter." Do you see that?

A. I see that.

Q. Now, have you flown with Mr. Stehn -- when is the last time you flew with Mr. Stehn on an aerial survey?

A. It was probably in the late '90s.

Q. Now, some of those photos as well from '02-'03 and '03-'04, not only were there, those photos being taken when they were doing low passes, but also they were taken by a 35 millimeter camera, were they not?

A. That's correct.

Q. And did that camera have a zoom lens?

A. No.

Q. Never had a zoom lens?

A. No, you wouldn't be able to take a picture at that speed

with a zoom lens with a 35 millimeter camera, manual one.
Q. Now, one thing that we didn't see -- at least I don't remember seeing in those photos, is juveniles. Aren't juveniles, particularly when they first get there, pretty brown?
A. There were juveniles in those photos.
Q. Okay. Well, aren't juveniles fairly brown when they arrive in December and January?
A. Well, sure. They're more brown when they arrive.
Q. And are they harder to detect when they're in the uplands, because everything else is brown?
A. I disagree with that. I mean, the uplands in that part of the world are either yellow grass, there's green grass, or oak, brown mud, dirt. I'm not sure what brown you're referring to.
Q. Let's turn to another matter. Let's talk about the necropsy reports —
THE WITNESS: Can I make a comment on this, Your Honor?
THE COURT: Yes, sir.
THE WITNESS: If I had 20 percent birds banded in previous years, I would expect more low level passes than if I have only 11.5 percent. So even though I don't know that Tom did more or less in that case, if you have less banded, you would expect to have less low level passes than if you had 20 or 30 percent.

THE COURT: So you can do the higher passes when you don't have band --

THE WITNESS: Right.

THE COURT: -- when you're not looking for bands?

THE WITNESS: There's less birds --

THE COURT: You don't need to --

THE WITNESS: -- to look to check, if you have less --

THE COURT: Because you're trying to identify individual birds with the low passes. And if they don't have the proper identification, there's no point.

THE WITNESS: Right.

THE COURT: Okay. I got that.

MR. FERNANDES: I think that was the point I was trying to make.

THE COURT: I got it.

BY MR. FERNANDES:

Q. You understand, don't -- let's switch to the subject of the necropsy reports. You understand, don't you, that there were only two carcasses, one partial carcass and an old pile of white plumage feathers located during the winter of '08-'09?

A. You said two?

Q. Two carcasses, one partial carcass, and a pile of feathers.

A. I thought there were four.

Q. That's how we get the four, two carcasses, a partial carcass --
A. Oh, okay. All right.
Q. -- and a pile of feathers.
A. I misunderstood. Sorry.
Q. I'm sorry. You do understand that?
A. Yes, I do.
Q. Okay. And let's look at DX 6. And in connection with arriving at your opinions in this case, this is one of the documents that you reviewed, did you not, the whooping cranes during '08-'09 report that Mr. Stehn wrote?
A. Oh, I'm sure I read it, yes.
Q. And if you turn to Page 27, specifically on Page 27, he describes, does he not, the first carcass that was found during the winter of '08-'09?
A. Except that the first bird, it was a bird that was alive. It wasn't a carcass at the time.
Q. I stand corrected. Doesn't he describe the first bird --
THE COURT: Is that the one that became an eventual carcass when it died at the vets or something.
THE WITNESS: Yes.
MR. FERNANDES: Yes. Yes.
THE COURT: Okay. I got it.
MR. FERNANDES: Yeah.
THE COURT: That's one of the four.

MR. FERNANDES: Yeah.

BY MR. FERNANDES:

Q. And on this first one, it says, does it not, the first bird was recovered on December 1st?

A. It does.

Q. And that was the first of the carcasses that was recovered that winter, was it not? I'm sorry, the first of the birds that was known to have been, to have died that winter.

A. Yes.

Q. The bird that was in Mr. Stehn's arms being carried to the vet.

A. Yes.

Q. Okay. And on that bird, it's reported here that when it was recovered, it was unable to stand and did not move when it was approached. Correct?

A. Correct.

Q. And it was also observed -- and then en route to the vet is when it died?

A. Yes.

Q. And if you look at the bottom, that which is in highlight, Mr. Stehn says, does he not, "A white plumaged whooping crane with a severe limp of the left leg with restricted foraging ability had been observed in Saskatchewan in 2008 during fall migration"? It is possible that was the same bird as the one picked up live at Aransas and had been unable to get enough

food over an extended period of time. Do you see that?
A. I see it.
Q. So --
THE COURT: So that can't be attributed to winter conditions in Aransas. That's the point?
MR. FERNANDES: I hope so.
THE COURT: All right.
MR. FERNANDES: Okay.
THE WITNESS: Well, Your Honor, I -- can I qualify that?
THE COURT: Yes.
THE WITNESS: This is Tom's opinion. Unless -- he cannot be sure it's the same bird.
THE COURT: Because it wasn't banded?
THE WITNESS: And I cannot be sure it's the same bird. Is it possible? Yes, it's possible.
THE COURT: Okay.
THE WITNESS: Is it the same bird for sure? No, we don't know.
THE COURT: I got it.
BY MR. FERNANDES:
Q. Well, as a matter of fact, when he talks about restricted foraging ability, doesn't that mean the restricted ability to eat food?
A. I assume that's what he means, yes, but --

THE COURT: Well, what he's -- what I understand from all of this --

MR. FERNANDES: Yeah.

THE COURT: -- is that this could be a carcass not attributed to the winter conditions in Aransas. Or it could be --

MR. FERNANDES: Yes.

THE COURT: -- a bird that's the death attributed to the winter conditions in Aransas, because the other bird could have died en route.

MR. FERNANDES: Yeah.

THE COURT: So it's iffy.

MR. FERNANDES: Yes.

THE COURT: So we don't know.

MR. FERNANDES: Well, we have a necropsy which suggests the cause of death is not water diversions.

THE COURT: It's an old injury.

MR. FERNANDES: Yes.

THE COURT: Okay.

MR. FERNANDES: Well, its -- the inability to eat was caused by --

THE COURT: The infection.

MR. FERNANDES: -- leg injury.

THE COURT: Great.

MR. FERNANDES: Okay.

THE COURT: I think we agreed on that --

MR. FERNANDES: Okay.

THE COURT: -- at the beginning.

THE WITNESS: What we don't agree is how the leg injury occurred.

THE COURT: What does that mean? What do you mean?

THE WITNESS: Well, Your Honor, if I saw a bird in that particular part of the, where it was, which is closer to the uplands, I have, I have personally observed great blue herons being captured and eaten by alligators at these ponds. So the fact that the whooping cranes are going to those ponds, I mean, I could easily -- I mean, I don't know this obviously, but one possibility is that it was a potential alligator strike and the bird got away. I'm just saying that as a potential alternative explanation to the fact that a bird flew from Saskatchewan with affected leg and then arrived and something else happened. I mean, I think there's -- since we have no specifics, there's no way of knowing how this bird got injured, whether in Texas, Nebraska, Saskatchewan or otherwise.

BY MR. FERNANDES:

Q. Okay. Haven't there been -- you're on the Whooping Crane Recovery Team. Hasn't there been previous probable causes of death identified of cranes that had a traumatic injury during migration but then died while they were at Aransas?

A. I believe so.

Q. And from review of Mr. Stehn's report, don't you agree that the leg injury could have been one of the causes of death of this crane?
A. Oh, for sure.
Q. Let's turn to Page 22 and talk about the second crane that died. Do you see here -- could you kind of pull it up so I can read it? You see it says, "January 13th, 2009, a whooping crane juvenile with its parents was observed in an aggressive interaction with a territorial family group at Aransas National Wildlife Refuge by nature guide Dan Freebow on January 13th in the a.m." Do you see that?
A. I do.
Q. And I think you previously testified today that you've previously seen aggressive behaviors when a particular crane is on another crane's territory.
A. That's correct.
Q. So this type of aggressive behavior you've seen in the past.
A. Yes.
Q. And then he goes on with the highlighting that says, "It could not get away from the aggressive adult that kept after it. In all, the chick ran for about 40 yards. The chick then permanently disappeared from sight down into the marsh grass, or down the embankment onto the edge of the bay, where it would have been out of sight and eventually the aggressive male

walked off. The parents of the juvenile that was chased tried to come back to the marsh, but were very nervous and couldn't come back due to the presence of the aggressive male defending his territory." Do you see that?

A. I do.

Q. Now, so just so we're clear, doesn't -- we talk about juveniles separating from the adult, but doesn't Mr. Stehn report here that an aggressive male crane caused a juvenile to become separated from its parents?

A. It does. But he also reports another behavior that I find extremely rare and unusual.

THE COURT: What do you mean?

THE WITNESS: Well, he talks about a chick running for 40 yards. Chicks at that stage have flown thousands of miles. And when being pursued aggressively by other birds in a territory, the best thing to do is fly away, not run away. That, to me, suggests that the chick was in not very good condition to fly at that point in time.

And the behavior, the other behavior that's common for chicks to do in Wood Buffalo National Park, whenever they're separated from the parents for any reason, they try to go into brush and hide. That's the behavior that is being described here as well.

BY MR. FERNANDES:

Q. After being chased by the aggressive male, did Mr. Stehn

report the juvenile disappeared from sight?
A. Is that the January 14th?
Q. Yes.
A. Yes, he does.
Q. And wasn't this, a juvenile found dead two days later?
A. Yes. I would assume that's the same bird.
Q. Now, aren't the, in your view, the two necropsy reports the best evidence of the cause of death of these two cranes?
A. That's the only evidence of the --
Q. Now, one of your opinions in this case is that the cranes were emaciated during the winter of '08-'09, but you can't tell, can you, from just looking at a crane, whether it's emaciated or not?
A. I cannot.
Q. So isn't your opinion that the cranes were emaciated during the winter of '09 based upon your review of the necropsy reports?
A. Yeah, emaciation is reported in the necropsy reports, yes.
Q. But would you agree that the best evidence of what caused these two cranes to be emaciated is the explanation offered by the pathologist in that necropsy report?
MR. MUNDY: Objection, that's argumentative, as it's phrased.
THE COURT: Sustained.
BY MR. FERNANDES:

Q. Is the best evidence of what caused the emaciation, in your opinion, the explanation offered by the pathologist?

MR. MUNDY: I sure appreciate the difference, but I'll let it go.

THE COURT: Well, what was the explanation?

MR. FERNANDES: I --

MR. MUNDY: I have no --

MR. FERNANDES: I wasn't --

THE COURT: What was the explanation offered by the pathologist?

MR. FERNANDES: The pathologist on this one, it was killed by a predator. It was also, had a disease virus, IBD type virus that caused a number of bacterial conditions, which basically is what led to the emaciation, emaciated condition.

THE COURT: Is that what the report said?

MR. FERNANDES: The pathologist says, "Predation, emaciation, IBD symptom." Our expert has looked at it, and he's looked at that report, and he's looked at the first page of that report where what's being described is all of the conditions that you expect with a disease, with a virus-like condition, the bacteria and all the infections, and concluded that that's what caused the emaciation.

THE COURT: Is he going to tell me that a bad diet couldn't have left him vulnerable to these problems?

MR. FERNANDES: He is going to tell you --

THE COURT: Yes, yes or no?

MR. FERNANDES: That, yes, it could have.

THE COURT: Okay.

MR. FERNANDES: Okay.

THE WITNESS: Your Honor, I -- my experience with -- we captured over 20 sandhill cranes in Nebraska to examine for IBD specifically. All the birds were alive. They were in migration. Some were fitted with radios afterwards, and they continued their migration to the northern grounds, to the breeding grounds. 60 percent of those birds had IBD. So just -- so my opinion of IBD being a cause, based on that experience, it's possible, but is that the cause? I cannot, I cannot agree with that.

BY MR. FERNANDES:

Q. Hasn't the Recovery Team specifically said that very little is known amongst diseases amongst the whooping cranes?

A. Yes, sir.

Q. In fact, isn't the -- as a result of that, isn't there a committee that's recently been formed in the last couple of years to look into the issue of diseases associated with these cranes?

A. No.

Q. Well, isn't Margaret Spaulding and Sandy Black looking at those issues today?

A. Yes, but that committee has existed for over a decade, not

the last two years.
Q. And isn't one of the reasons why the radio telemetry devices are being put on the cranes beginning in '08-'09 and blood samples so that more can be known about the diseases affecting these cranes?
A. No.
THE WITNESS: If I could expand, Your Honor?
THE COURT: Please.
THE WITNESS: I proposed that project probably going back to 2002 or 2003, putting telemetry devices on whooping cranes, for the primary purpose of determining mortality on migration. That is the primary purpose of that project.
It took a long time for the Recovery Team and agencies to agree to have that project authorized and okayed. So the fact that we begun the field work for the telemetry project in the winter of '09 is not in response to any of that. That had been a process that had taken almost ten years to get there. And the primary objective --
THE COURT: Does that bother you, the length of that?
THE WITNESS: -- was not to look at health of the birds, it was to look at mortality on migration.
THE COURT: Is that frustrating?
THE WITNESS: What, ma'am?
THE COURT: Well, to have from 2002 to 2009 --
THE WITNESS: It was very frustrating.

THE COURT: -- have your idea come into --

THE WITNESS: I had to bring it up constantly until finally we agreed that it had to be done.

THE COURT: It was a good idea.

THE WITNESS: So yes, that's, so that is not the reason. Obviously, when you collect a bird and you have it in hand, especially when the bird is rare, and with such good information as we have, we want to get as much information as possible. Collecting blood will give us a lot of information --

THE COURT: Banding, blood, putting the radio, as much as can you at one time.

THE WITNESS: -- about disease, it will give us genetics, we've taken measurements and weights. We're gathering as much information as we can when we have a bird in hand. Now, that is not in response --

THE COURT: Is worth two.

THE WITNESS: The protocols for that were established well before Mr. Fernandes is suggesting.

MR. FERNANDES: When did --

THE COURT: So there.

MR. FERNANDES: Yeah, well, I have one question.

BY MR. FERNANDES:

Q. When did you start doing blood samples?

A. Start doing blood samples?

Q. When did you start taking those blood samples? Wasn't that three years ago?
A. The first time we collected, we trapped a bird.
Q. Okay. 2009?
A. But we submitted permits for that a year in advance, way before any of that has happened.
Q. I'm just trying to get an answer to a simple question. That is, these blood samples that are now being taken, didn't that begin in 2009?
A. Yes.
THE COURT: But he's telling me not as a result of the bad year in '08-'09.
MR. FERNANDES: We'll come back to that.
THE COURT: So we're all there.
MR. FERNANDES: Yeah, we'll come back to that.
THE COURT: Okay.
BY MR. FERNANDES:
Q. Just so we're clear, you have no veterinary degree?
A. That's correct.
Q. You have no degree in pathology?
A. That's correct.
Q. And you have no training or certifications in the areas of diagnostic pathology or veterinary pathology?
A. That's correct.
Q. And you've never been employed as a diagnostic veterinary

pathologist?
A. That's correct.
Q. And you've never taught any courses in diagnostic pathology or forensic pathology?
A. I have not.
Q. And you've never written or published any articles concerning postmortem examination of wildlife to determine cause of death?
A. I have not.
Q. And you've never performed a necropsy?
A. That's correct.
Q. And you've never been retained to do an analysis of a necropsy report?
A. That's correct. And I don't think I know anybody who has.
THE COURT: I was going to ask about all this. Is there any, any veterinarian in the world that specializes in whooping crane mortality?
MR. FERNANDES: Well, our expert actually did the first necropsy --
THE WITNESS: Or reading necropsy reports.
MR. FERNANDES: -- that was ever done on a whooping crane and did the first three --
THE COURT: But one, does that make you an expert?
MR. FERNANDES: Well, did the first two or -- there's not that many. He's done more than anybody in the world.

THE COURT: I can believe that. But I'm just saying I wonder --

MR. FERNANDES: Yeah.

THE COURT: -- if two makes you an expert.

MR. FERNANDES: I guess two's better than zero.

THE WITNESS: I've read two.

THE COURT: It's more than I've done.

BY MR. FERNANDES:

Q. And you have never said --

THE COURT: So I'm just saying maybe this line is not --

MR. FERNANDES: I'm going to --

THE COURT: -- is not helpful.

MR. FERNANDES: I'm literally going to, just for the purpose of the record, two questions.

THE COURT: You got it.

MR. FERNANDES: Okay.

BY MR. FERNANDES:

Q. You have never served as an expert witness on the issues relating to cause of wildlife mortality?

A. No.

Q. And you've never been retained by anyone to do a forensic investigation to determine cause of death of any species?

A. I have not.

Q. Now, you said in connection with your direct examination

that four carcasses is indicative of high level of mortality? Do you recall that testimony?

A. I'm not sure if that's what I said. I said it was the highest number of carcasses that we have ever collected at Aransas during any particular winter.

Q. But when two carcasses were found, for example, in 1951, there were only 25 cranes. Correct?

A. I'll trust your numbers on that.

Q. And have you looked at the carcasses recovered since 1951 as a percentage of the total flock?

A. I have not.

Q. Would it surprise you if I were to tell you hypothetically that as a percentage of the total flock the carcasses recovered in prior years represent 2.2 percent of the flock?

A. In prior years to '08-'09?

Q. Yes.

A. I'm not sure I'm surprised by that statement. I'm not sure what you mean by being surprised.

Q. Well, I guess I'll ask it this way. Recovering four when you've got a flock size of, even if you assume it's 270, that's 1.5 percent of the total flock.

A. Right.

Q. And my question is, have you looked at the numbers from 1951 to the present to see, if you look at it relative to the total number of cranes in the flock, whether or not four

carcasses is high or low?
A. I have not, but if I was to look at that data set to compare the differences between '08-'09 and other years, I would not look at the size of the flock, but rather at the estimated mortality events that occurred during each winter.
Q. So is your answer no, that you haven't looked at the --
THE COURT: You can put that on a table, if you'd like.
THE WITNESS: I did say no before, yes, sir.
MR. FERNANDES: Okay, thanks. I'm just leery of getting close to that speaker.
THE COURT: That's all right. There will be a small fine.
MR. FERNANDES: That's why I have my two Kathys with me, to pay it.
BY MR. FERNANDES:
Q. Could you, could we go to Exhibit 102 --
THE COURT: You're going to have to talk to Ms. Snapka.
MS. SNAPKA: I will, Your Honor.
MR. FERNANDES: The partners that make more money than me -- that was a compliment -- and they can pay my fine. Page 5 --
THE COURT: That was quick.
MR. FERNANDES: All right. Could we look at -- I'm

sorry. Let's go back -- you want me to go back to the original?

THE COURT: No, no.

MR. FERNANDES: Oh, my explanation?

THE COURT: Just making a side-bar comment.

MR. FERNANDES: Okay.

THE COURT: Totally inappropriate.

BY MR. FERNANDES:

Q. Let's look at -- first of all, you have seen the March 2007 Recovery Plan?

A. Yes, I have.

Q. Okay. Let's go to Page 5, please. Do you see there where it says, "Few carcasses are ever found, and thus no known causes of mortality can be attributed to high percentage of losses"?

A. I see it.

Q. And you agree with that statement, don't you?

A. In general.

Q. Okay. Now, let's go to your dissertation, PX 13. Now, while wintering at Aransas, you talked about the cranes eat a lot of foods. And what I want to talk about real quickly is what we haven't talked about yet is whether or not there's a pattern of what they eat when during the course of a winter. Are you with me?

A. Yes.

Q. All right. Let's start out with basically Page 2 of your dissertation. Now, there's been testimony on some of this, but I don't recall in your direct examination you identifying all of these as items of food that the cranes eat. Are these items, blue crabs, razor clams, wolfberry, fiddler crabs, honch (sic) shells, snails, shrimp, crayfish, acorns, fish, snakes, insects, all part of the diet?

A. Among others, yes.

Q. And isn't the wolfberry crop well past its peak and over by the year in December?

A. Yes.

Q. And in January, don't the cranes' food habits shift and dramatic, dramatically to foraging in open bay habitat for clams and invertebrates in the substrate?

A. Well, they stop eating wolfberry because they're no longer available, but I'm not sure that I can just say they're shifting to clams at that point in time.

Q. Let's look at Page 68 from the deposition. Do you recall when I asked you, question, "Whooping crane food habits shift dramatically to foraging in open bay habitat for clams and invertebrates in the substrate?" And then I say, "Is that consistent with your observation?" And you said, "That during the time I was there for my dissertation, I did observe that. I don't know if it's a generalized trend that happens every year." Is that still your testimony?

A. Yes. I think what I'm saying is I have observed and recorded a high use of clams at a certain point in time, but I'm not -- what you said is if it happened in January, and I cannot recall if that's exactly what I recorded at that time.
Q. Well, in any event, doesn't the cranes' diet change throughout the winter to exploit shift in patterns of food availability with various months dominated by different foods?
A. Yes.
Q. And don't the uplands provide an important feeding site where cranes may obtain foods rich in nutrition and energy?
A. It depends on how you define "important."
Q. Could you go to Page 83 of the deposition. Do you recall when I asked you, "And don't you believe that the upland burns may be an important feeding site where the cranes may obtain foods rich in nutrition and energy?" And your answer was, "For short periods of time during the winter, yes." Is that still consistent with your testimony today?
A. Yes, it -- it's not a yes, it's for short periods of time only, not --
Q. Okay. Okay. But for short periods of time, do you believe that occurs?
A. Yes.
Q. And haven't biologists concluded that for some periods of the winter, food items other than wolfberries and blue crabs constitute a large portion of the whooping crane diet?

A. In some times of the winters, in different winters, yes.
Q. Now, isn't the Hunt/Slack study, which was a fecal study, one of the most comprehensive fecal studies covering an entire winter over multiple winters that examined the whooping crane diet?
A. Yes. At that point in time it was probably the most comprehensive one to date.
Q. Let's look at Hunt --
THE COURT: What year was that?
MR. FERNANDES: I'm sorry, that was -- first I'm going to give you a DX number. That was 1983 to 1985, Your Honor. And what I want to do is first go to Page 1, and we're going to be offering this, the -- this document and the pie chart in as DX 378.
THE COURT: Any objection?
MR. MUNDY: No, Your Honor.
MR. FERNANDES: First let's go to --
THE COURT: Wait a minute.
MR. FERNANDES: I'm sorry.
THE COURT: I've got too many lists going.
MR. FERNANDES: Okay.
THE COURT: Go ahead.
BY MR. FERNANDES:
Q. Let's go to, first let's go to Table 1. And in Table 1, this is a fecal study, is it not? And what it has is the diet

for the crane over the course of two different winters. Correct?

A. Correct.

Q. And winter number one, 1983-1984, clams 49.4 percent, blue crab -- I'm sorry. Yeah, blue crabs 42.9, wolfberry .8. And then if you go to '84-'85, you see clams 28 percent, blue crabs 40 percent, snails 12.4, insects .01, wolfberry 13.07. Do you see that?

A. I'm trying to catch up, but yes, I think.

Q. Well, I'm kind of a visual learner, so we created a pie chart so we can look at this. First let's look at what was observed on that first year.

THE COURT: Is that part of -- is that part of the exhibit?

MR. FERNANDES: Yes.

THE COURT: No objection?

MR. MUNDY: We -- I don't object to it, but it's not part of the hunt and slack article. This is the --

MR. FERNANDES: Oh, yeah.

MR. MUNDY: -- summary the lawyer created as a demonstrative illustration. But I don't object to it.

THE COURT: Make that a different exhibit, please.

MR. FERNANDES: Okay.

THE COURT: How about we do that?

MR. FERNANDES: Okay. Why don't we put it at the

end. What number?

THE COURT: 278A? How about that?

MR. FERNANDES: 378A.

THE COURT: Yeah, 378A?

MR. FERNANDES: Okay.

THE COURT: Okay. Any objection to 378A?

MR. MUNDY: No, Your Honor.

BY MR. FERNANDES:

Q. So on this first winter, if I'm looking at it -- and this is the diet over the course of the winter, blue crabs were 42.9 percent. Correct?

A. Could we go back to the graph? I want to see what numbers we're using here.

Q. Oh, sure.

THE COURT: Would you like to have that in front of you?

MR. FERNANDES: I think I can get it.

THE COURT: Maybe you could provide him -- you know what? How about lunch time?

MR. FERNANDES: Okay.

THE WITNESS: Great.

THE COURT: Are y'all having any problems eating in an hour and coming back?

MR. FERNANDES: No.

THE COURT: I mean, I always eat my food here, so it

doesn't matter.

MR. BLACKBURN: An hour and fifteen --

MS. SNAPKA: Yes, Your Honor, because we walk across to the hotel, or walking outside to obtain food and come back, it's a little tight.

THE COURT: Okay. How much time do you want?

MS. SNAPKA: I think if the Court would be inclined to give us until 1:30, that would be a very generous amount.

THE COURT: I'm never that generous.

MS. SNAPKA: 1:15?

THE COURT: Okay, if we do 1:30, we'll go to 6:00. Okay? Is that all right?

MR. FERNANDES: That will do.

THE COURT: Okay.

(Recess from 11:58 a.m. to 1:27 p.m.)

THE COURT: Mr. Chavez-Ramirez, would you take the stand again, please, sir?

MR. MUNDY: Your Honor, with opposing counsel's permission, he's given me advance copies of what he's using. I'm going to put a copy on the stand for the witness so it helps expedite their communication.

(Counsel conferring off the record.)

MR. FERNANDES: May we proceed, Your Honor?

THE COURT: Yes, sir.

BY MR. FERNANDES:

Q. Good afternoon, sir.
A. Good afternoon.
Q. Let's go back just two things, to the point we were before, and that is, I think I asked you, aren't there patterns to what the cranes eat in most winters. Do you remember that line of questioning?
A. Yes, I do.
Q. And when the cranes first arrive, aren't wolfberries and blue crabs generally readily available?
A. Well, whoopers, most years, I would say yes.
Q. And you believe that Mr. Stehn's blue crabs surveys are reliable, don't you?
A. They're based on the evaluation that was done by Pojasek, yes.
Q. And don't Mr. Stehn's blue crab surveys show that blue crabs are generally not very abundant during the months of January and February?
A. I think in general you're correct.
Q. In fact, if we look at Defendant's Exhibit 377, 377 --
MR. FERNANDES: I'll move to admit Defendant's Exhibit 377.
MR. MUNDY: No objection, Your Honor.
BY MR. FERNANDES:
Q. And sir, this is a, what we've captured here is ten years worth of data from Mr. Stehn's blue crab count surveys. And

this reflects, does it not, that generally speaking blue crabs are very abundant during the month of November -- I'm sorry -- blue crabs are very abundant during the month of November. December it starts to taper off, and then in January and February of a typical year, blue crabs are very, not very abundant in January and February. Correct?

A. I'm not sure I -- we're looking at averages over ten years, is what each one of these points represents. Is that correct?

Q. Uh-huh.

A. So I can't, if we say averages, which you didn't say, I would agree with you. Otherwise, we'd have to look at the numbers. I'm sure some years they're not always high in November or low in January, for example, so --

Q. I understand. What we're talking about is general patterns that may or may not be true from year to year. Correct?

A. Okay.

Q. But you do agree with me that on average that's consistent with what you observed, and that is, January and February blue crabs tend not to be quite as abundant.

A. Well, I have to go back to my personal experience, and in general, yes, I would agree that sometime beginning of the year, middle of the winter, seems to be an increasing trend in blue crabs, as far as I have observed.

Q. All right. Let's go back to where we left off before we broke, and that was Defendant's Exhibit 378A. And you had asked me to give you a copy of the Hunt article so you could look at the numbers and compare them against the pie chart. Do you have those numbers in front of you?

A. I do.

Q. And this is the first year of that Hunt/Slack study, is it not?

A. Yes, it is.

Q. And if you look at this year, it reflects, does it not, that if you look at both blue crabs and wolfberry together, they made up less than 44 percent of the cranes' diet during the year 1983-1984?

A. Yeah, but only with the qualifier that we're looking at the proportion of different food items in feces.

Q. Uh-huh.

A. Right?

Q. Yes.

A. That's what this is reflecting.

Q. Yes.

A. Yes.

Q. And you did a feces study as well, did you not, back when, in connection with your dissertation?

A. After my dissertation, yes, sir.

Q. And if we look at, and there it shows in connection with a

list of feces, clams made up almost 50 percent of the diet, according to that fecal analysis during the winter of '83-'84?
A. Again, clams made up about 50 percent of the proportion of the feces, yes.
Q. As opposed to frequency?
A. As opposed to frequency or diet in general.
Q. Let's look at, now let's look at the second winter, DX 380.
MR. FERNANDES: Move to admit DX, Defendant's Exhibit 380.
MR. MUNDY: As long as we have the same explanation on the record, this is the lawyer's summary, it's not from the actual underlying exhibit itself.
MR. FERNANDES: Yes. We'll do that, and that's why we did it separately, per the Court's instruction.
THE COURT: I had it as 378 -- oh, that's a different pie --
MR. FERNANDES: Yes.
THE COURT: 380.
MR. FERNANDES: This is a different year. The last one --
THE COURT: 380 is admitted. Thank you.
MR. FERNANDES: Okay.
BY MR. FERNANDES:
Q. And just so it's real clear on the record, these are pie

charts that we did based upon the exhibit that had been previously admitted, which is the Hunt/Slack, Hunt/Slack exhibit. So in this second year of this fecal analysis, '84-'85, if you look at clams and wolfberry together, it made up about, what, 53.8 percent of the diet?

A. Yes.

Q. Okay. And let's look at these two together so we can kind of compare what happens from year to year. If we can look at Defendant's Exhibit 381.

MR. FERNANDES: I'll move to admit Defendant's Exhibit 381, which are the pie charts that we created based upon the Hunt/Slack article.

MR. MUNDY: As long as there's clarity in the record, all these pie charts are just lawyers' summaries, no objection with that.

THE COURT: Well, what was 378A?

MR. FERNANDES: 378A was the Hunt pie chart 1. 380 was Hunt pie chart 2, and this is the comparison of the two.

THE COURT: And the number?

MR. FERNANDES: 381.

THE COURT: Thank you, sir. That's admitted.

BY MR. FERNANDES:

Q. And so when you look at these two years together, what you see, do you not, is the, at least from a fecal analysis, the diet changes from year to year.

A. Correct.
Q. For example, if you look at year one to year two, what you see is that the clams, frequency of eating clams goes down from 49 to 28 percent in year two, but the wolfberry goes up in year two. Correct?
A. That's correct.
Q. And what you see in year two that you don't see at all in the 1983-'84 year is you start seeing snails and insects becoming a bigger part of the diet, at least from the standpoint of the fecal analysis?
MR. MUNDY: Just for sake of clarity, I don't want to object to the question in its entirety. But clarity, as measured by volume or number of samples?
MR. FERNANDES: Volume.
MR. MUNDY: Okay.
BY MR. FERNANDES:
Q. And let's talk about frequency, number of samples. If a hundred cranes ate one wolfberry, that would be 100 percent on a frequency analysis. Correct?
A. If the -- I'm sorry, could you repeat the question?
Q. Sure. If a hundred cranes had one wolfberry, if we were measuring frequency instead of volume, you would show 100 percent of the cranes had frequency, if there were a hundred cranes and they all had one wolfberry. Right?
A. You never say cranes, you would say feces samples.

Q. Okay.
A. So if feces one had wolfberry --
Q. Well, let me go at it this way. In any event, this is based upon volume. And when you did your energetic analysis in connection with your dissertation, did you use the information based upon volume?
A. Yes.
Q. Now, what, if any, food items do you believe were not available or abundant during the winter of '08-'09?
A. Were not available?
Q. Or abundant.
A. Or abundant.
Q. During the winter of '08-'09.
A. I think wolfberries were -- and again, I'll have -- this is highly -- Your Honor, I was only there for a week in February, so -- but when I went and looked at the areas where I knew wolfberry plants were pretty abundant from previous sampling, I found that a lot of wolfberry plants were dead. A very large number. So I'm not sure when they died or how they died.

So, but to me that would suggest that wolfberry was probably not as abundant that year as in other winters. Again, obviously I'm basing it just on what I just said, not the fact that I actually measured it in the wild.

I saw a few crabs, but again, it was only during that week

I was there, so I can't -- I couldn't, I don't have personal knowledge of the rest of the time before or after I was there, so I couldn't say that for sure either.

So, I mean, those are the two things that I could address perhaps to some extent, based on my opinions and previous experience there.

Q. Are there any other food items that you believe were not available or abundant during the winter of '08-'09?

A. I did not specifically sample for any other food items, so I couldn't say.

Q. Aren't the only food items that Mr. Stehn surveyed during the winter of '08-'09 blue crabs and wolfberries?

A. I believe so. I'm not --

Q. During the winter of '08-'09, no surveys for food availability/abundance were conducted in areas where 75 percent of the cranes reside. Correct?

A. Probably.

Q. Now, let's talk about Mr. Crane -- Mr. Stehn's -- sorry --

UNIDENTIFIED SPEAKER: Freud.

MR. FERNANDES: Sorry. Let's start over.

THE COURT: That may be an admission against interest.

BY MR. FERNANDES:

Q. Let's talk about Mr. Stehn's blue crab count during the winter of '08-'09. Doesn't Mr. Stehn generally measure blue

crab abundance by doing a monthly one-hour walk through a transact?

A. Yes.

Q. Let's look at Defendant's Exhibit 6. And this is, this report is one of the documents we discussed earlier that you relied upon in connection with your opinions in this case?

A. Right.

Q. Let's look at Page 64. Now, if you look at Table 16, it's identified, is it not, as the monthly blue crab surveys done in the winter of '08-'09?

A. Yes.

Q. Now, during the winter of 2008-2009, didn't Mr. Stehn fail to perform blue crab counts during the months of January and February?

A. Well, there's a February date in there.

Q. I'm sorry, January and March.

A. Yes.

Q. And doesn't Mr. Stehn specifically say that his blue crab count for November was probably understated?

A. He does.

Q. In that asterisk footnote?

A. Yes.

Q. So from Mr. Stehn's surveys, don't we know that blue crabs were available to the cranes during the winter of '08-'09?

A. That they were available?

Q. That there were some blue crabs out there available to the cranes.
A. In November, looks like there was some crabs around. The rest of the time, it doesn't look like there's much out there.
Q. Well, when you were out there in February, you saw blue crabs, didn't you?
A. I saw a few blue crabs, yes, sir.
Q. Let's talk about what may have impacted blue crab abundance during the winter of 2008-2009. Let's go to Plaintiff's Exhibit 20, specifically C. Isn't this a poster that you used for a meeting of the Water Bird Society in 2009?
A. Yes.
Q. And isn't this poster a summary of your observations from your February 2009 visit to the refuge?
A. Yes.
Q. Let's focus on Table 1 at the bottom of this document. In this chart, aren't you suggesting that the blue crab capture rate in February of 2009 was lower than the bad year of 1993 and 1994?
A. Yes, that's what I estimated.
Q. And doesn't your February 2009 data come from five days that you visited the refuge in February of 2009?
A. Yes.
Q. And haven't we established that blue crabs are generally not very abundant, or certainly not as abundant as they

generally are in October and November in any given year?
A. Based on the averages of Tom's graph, we'd have to see all the years.
Q. So isn't comparing the blue crab availability from five days in February of 2009 with blue crab abundance across the entire winters of '93 and '94 and '92 and '93, like comparing apples to oranges?
A. Well, I wasn't comparing abundance of blue crabs. I was comparing capture rates of blue crabs by whooping cranes.
Q. Well, isn't comparing blue crab capture rates in five days in February across data from entire winters like comparing apples and oranges?
A. I think you need to explain that to me. I mean --
Q. It's not very scientific, is it?
MR. MUNDY: I object to that question as unclear. What are you arguing about?
THE WITNESS: I don't understand.
MR. FERNANDES: Let me rephrase the question.
THE COURT: Why don't you clarify that --
MR. FERNANDES: Sure.
THE COURT: -- just a tad. Thank you.
BY MR. FERNANDES:
Q. If you were asked to perform a study, would you rather take five days of data from February of 2009 and compare it across data from two entire winters?

A. It depends on what the objectives of the study is. I was not asked to do a study that year.
Q. When you were doing your dissertation in '92-'93, and '93-'94, you compared data across entire winters against each other. Correct?
A. That's correct.
Q. What this does is take five days in a month when generally blue crabs are not available, compares that capture rate against data from across two winters. Right?
A. That's correct.
Q. Now, don't you call the '93-'94 year a bad year, because blue crabs were not very abundant?
A. Well, my reference to bad years has to do with whooping crane mortality.
Q. But isn't it your opinion that blue crabs were not very abundant by virtue of these capture rates during the year '93-'94?
A. The capture rates of blue crab that I conducted in '93-'94 were much lower than they were in '92-'93, yes.
Q. And let's talk about why the blue crabs were less abundant in '93-'94, versus your first year, '92-'93. Let's go to your dissertation, Plaintiff's Exhibit 13. Specifically, let's look at Page 89. This is from your dissertation. You explain, do you not, why blue crabs are not as abundant that second year of your study?

"The extremely low abundance of blue crabs during the 1993-'94 winter was due to mortality associated with an extremely low tide that occurred during August and September 1993. The effect of this low tide was that water levels decreased below the substrate of the marshes, and all the marine life perished." Do you see that?

A. Yes.

Q. Isn't that consistent with what you understood — well, strike that.

Wasn't the reason that blue crabs were not very abundant during the '93-'94 winter because there were low water levels caused by low tides?

A. That was an explanation at the time.

Q. And when water levels drop because of tides, don't the crabs move out to the salt marshes, and the cranes can't -- the cranes no longer forage on them because they're too deep in the water?

A. Yes, some move out and some actually are in a sense --

Q. When you visited the refuge --

MR. MUNDY: Can he finish his answer, Your Honor?

MR. FERNANDES: I'm sorry. I'm sorry. I didn't know. He's so quiet --

THE COURT: Go ahead, please, sir.

MR. FERNANDES: -- I miss it sometimes.

MR. MUNDY: Keep your voice up, if you will, sir.

THE WITNESS: Sure.
BY MR. FERNANDES:
Q. I apologize.
A. I was going to say that when the tides go down, yes, a lot of crabs go out with the tide. But in some of the enclosed ponds and pools out there, there's no way for them to go anywhere. They're stuck there.
Q. When you visited the refuge for those five days in 2009, didn't you observe extremely low water levels?
A. Yes.
Q. Let's look at how you describe what you observed during the February of 2009 visit. Let's look at Defendant's Exhibit 124. Isn't Defendant's Exhibit 124 the document that you provided to Mr. Stehn describing your observations during that five-day visit?
A. Yes.
Q. And let's pull up and read the general observations. This is what you observed, is it not? "The salt marsh areas of Aransas, which are normally comprised of the majority of individual whooping crane territories, had extremely low water levels. Areas normally flooded and which comprised open water salt marshes described in Chavez-Ramirez 2006 were dry, some showing mud cracks as deep as four to five inches. This would mean crabs had moved out towards the bay, following decrease in water levels, or as we observed in several instances, would

burrow into the substrate. Digging into the substrate is common blue crab behavior associated with cold weather events and apparently also low water levels." Do you see that?

A. Yes.

Q. Let's see how you report the observations in your poster that you submitted in connection with your meeting with the Water Bird Society. Let's go to PX 20 again, please. And let's pull up results in Figure 2. And here it's described as, "The salt marsh areas had extremely low water levels. Areas normally flooded and which comprised open water salt marsh as described in Chavez-Ramirez 1996 were dry. Blue crabs were burrowed deep in the substrate. A large number of wolfberry plants appeared dead."

Figure 2, you took a photo of the salt marsh areas, taken in February of 2009, and you say, "In previous years, the same area was flooded." Correct?

A. Yes.

Q. So what you're describing here is a, water levels which were even lower than what you had observed during '93-'94 when you went out to visit the refuge for those five days in February of 2009. Correct?

A. Well, I don't know if they were lower. I really can't say that for sure.

Q. When you visited the refuge in February 2009, weren't there dramatic differences, compared to what you observed when

you were at the refuge doing your field work in '92-'93 and '93-'94?
A. Yes.
Q. And because of those low water levels caused by low tides, didn't you see a lot of dead crabs, blue crabs in February 2009?
A. Yes.
Q. And because of those low water levels caused by low tides, didn't you see other blue crabs buried in the substrate?
A. Yes.
Q. Let's look at Defendant's Exhibit 311. And let's talk about what's going on here.
MR. FERNANDES: Could we have it just a little darker here? I'm having trouble seeing. Does it dim?
THE COURT: This is as dark as it gets in here.
MR. FERNANDES: Oh, okay. Oh, I didn't realize it.
THE COURT: Can you brighten your image? Well, I mean, I can turn out the lights altogether.
MR. FERNANDES: No, no. I thought it was already dimmed. I'm sorry. Well, we'll work off this.
BY MR. FERNANDES:
Q. In any event, let's talk about what you observed when you were out there in February of 2009 for those five days. I think this is our exhibit, 311, but it was a Plaintiff's exhibit you talked about on direct.

A. Right.
Q. You said these are the salt marshes. Correct?
A. Yes.
Q. And what you were talking about, what you observed when you got out there in February of 2009 is the water levels had, were extremely low. Correct?
A. Yes.
Q. And when the water levels are extremely low, what happens is the water moves out of those little ponds in the salt marshes. Correct?
A. Yes.
Q. And those blue crabs that are fortunate kind of go out there and make their way back into the bay. Correct?
A. That's what I expect, yes.
Q. Others get buried in the substrate. Right?
A. Yes.
Q. And others die. Right?
A. Yes, get eaten, die, yes.
Q. And so what was impacting blue crab abundance when you were out there in February of 2009 were those low water tides, were those low tides, weren't they?
A. Well, as you pointed out before, I was only there for a few days, and water levels in this area are heavily influenced by winds. So in a matter of a few days, things could change. So I don't know what happened before or after I was there.

Q. And I neglected to point that out. What happens, doesn't it, is you have the north winds that come in and blow the water out. You have the low tides moving the water out. And so areas that usually have blue crabs are dry, and the blue crabs either die, get stuck in the substrate or are fortunate to move back into the bay. Correct?

A. Yes.

Q. Now, haven't you previously studied the relationship between salinities and whooping crane mortality?

A. I tried to do some exploratory analysis of that, yes.

Q. And you were talking about your experience with statistics, but in fact, when you did your dissertation, you had to do a statistical analysis as part of that dissertation, did you not?

A. Well, yes, of course.

Q. Now, let's go to DX 121, please. This is Defendant's Exhibit 121. Isn't this a paper that you presented at the North American Crane Workshop in 2003?

A. Just to clarify, what I presented was a presentation. This is kind of a summary of what I presented, done afterwards.

Q. And in this paper, didn't you attempt to determine if there were any significant statistical relationships between variables for the -- for a 20-year period of time, 1978 through 1998?

A. Yes.

Q. And over that 20-year period, you found no significant relationship between salinities and crane mortality. Correct?
A. I'm going to have to get reacquainted with this. It's been a few years, sir.
Q. Were you acquainted with it when I took your deposition?
A. After you brought it up, yes.
Q. Okay. In fact, we took a break before I asked questions, and you went out with Counsel for about ten, fifteen minutes. Correct?
A. Correct.
Q. Let's look at what you said when I asked that question.

MR. MUNDY: Well, excuse me. I object. This is improper impeachment. He has not denied any statement. He's going --

THE COURT: Sustained.

BY MR. FERNANDES:
Q. So just so I'm clear, in that paper -- you discussed that paper on your direct examination, did you not?
A. Yes.
Q. And did you review that paper in connection with preparing for your testimony today?
A. No.

MR. FERNANDES: Do we have a copy, a hard copy of that? Let's just go to, let's go to the pertinent provisions.

THE COURT: The what?

MR. FERNANDES: I'll just go to the section, the pertinent provisions of the paper.

THE COURT: Well, he wanted to review the paper, I think.

MR. FERNANDES: Okay.

THE COURT: Is that right?

THE WITNESS: Well, I'd like to remember what was done. It's been quite a few years.

MR. MUNDY: And Dr. Chavez, I'll ask you, if the Judge asks a question, please answer her question directly to her, sir.

THE WITNESS: Yes, sir.

MR. MUNDY: And keep your voice up, if you would.

MR. FERNANDES: May I approach, Your Honor?

THE COURT: Yes.

THE WITNESS: Thank you.

(PAUSE.)

THE WITNESS: So the question, I'm sorry, you asked was, did I look at crane mortality versus salinity?

BY MR. FERNANDES:

Q. No. Let me go at it again. In this paper, didn't you attempt to determine if there were any significant statistical relationship between variables for the 20-year period 1978-1998, just between variables?

A. Yes.

Q. And over that 20-year period, you found no significant relationship between salinities and crane mortality. Correct?
A. Salinity and crane mortality? Yes.
Q. And didn't you also find that for that 20-year period from 1978 to 1998 there was no significant relationship between blue crab abundance and crane mortality?
A. Blue crab abundance -- well, when I -- blue crane -- blue crab abundance, as we have been talking about, is completely different here. The variable that I had for blue crab is blue crab commercial landings, so they were not -- and the sampling for crabs that Texas Parks and Wildlife did. So it's not abundance at all like we were talking about before in the marsh, just to be clear. But yes, the answer with that caveat would be.
Q. And you didn't even attempt to perform a statistical analysis of fresh water inflows to whooping crane mortality because it's not what directly impacted the behavior of the cranes. Correct?
A. Yes, the reason I did not do that, and I explained in here, what I was trying to do is look at correlations between variables that were biologically meaningful and direct. So I would assume that fresh water inflows would impact salinity directly. Salinity impacts a whole host of other things, as has been talked about before, which I don't need to get into.
So I didn't do any correlations between variables that

were, that had other potential variables in between them, because this was highly preliminary, with the expectation that we would devise research afterwards to try to focus on whatever possibilities we would find.

Q. So just so I'm clear, if I'm understanding, the reason why you didn't even look at whether or not inflows impacted crab, I mean, blue crane mortality -- blue crane -- whooping crane mortality is because you believed that they weren't even biologically dependent variables?

A. No, no, no. That's not what I said.

Q. Okay.

A. I said they were not directly connected. I don't expect -- it's an indirect connection, as far as I'm -- I mean, I'm looking at the relationship to food resource, and water inflows impacting that resource, not whooping cranes directly.

Q. Let's look at GBRA 71, 75 to 76. Here you say, "Caution note: This exploratory analysis is not intended to imply that any relationships found here are cause and effect."

You go on to say, "The finding of a statistically significant relationship may also serve to suggest a causal relationship; however, the underlying mechanism or process will not be explicit or implied in any of the variables examined."

And you go on to say, "Therefore, any significant relationships found are reported here because" -- or "reported here should be used to generate potential hypotheses, or

hypothesis at the focus, as to focus for further research and evaluation to determine the actual cause-effect mechanism or process." Do you see that?

A. Yes, that's --

Q. Let's talk about what you mean by that. So in other words, even if you found a significant relationship between blue crab abundance, for example, and another variable such as crane mortality, aren't you cautioning the reader that you should not imply cause and effect without doing the science and the biology?

A. That was a very complicated question.

Q. I don't know if I understood it. Let me break it down. Aren't you cautioning the reader that even if you find a significant correlationship between two variables, you shouldn't imply cause and effect?

A. That's right.

Q. And aren't you cautioning the reader that even if you find a significant relationship between two variables, you still have to do the science to determine whether or not A equals C, so to speak, those two variables?

A. Well, as my last sentence there implies, that was the objective of this analysis is to try to determine what factors or variables we should investigate further, yes.

Q. In fact, when you do studies, when you do studies for the purposes of publications, don't you do your scientific study,

and isn't it supported by that statistical analysis?
A. Yeah, most of the time, we have to do some subsequent analysis in most of the research that is done currently.
Q. So your study has two components, the biology, the science, and then the statistical component?
A. Most, most studies, yes.
Q. And for example, if you were trying to determine whether or not -- you came up with a hypothesis that there was a significant correlation between inflows and crane mortality, wouldn't you then have to do the science and determine, for example, whether or not reduced inflows caused an increase in salinity?
A. If reduced inflows caused an increase in salinity?
Q. Yes.
A. Yeah, that's pretty obvious, I would assume.
Q. And wouldn't you also have to do, look to see whether or not those incremental increased salinities caused a decrease in blue crab and wolfberry abundance?
A. Well, I wasn't -- that wasn't the goal of this presentation. I mean, so I think you're trying to stretch what I was trying to do here a little beyond what my objectives were.
Q. My point is, merely finding a statistical relationship is not where you end the analysis. You've got to go do the science and see whether or not your hypothesis is correct.

A. Well, I would word it differently. If we could find the correlation between many different variables, obviously if we, whatever those variables are, they could be completely nonsensical, like temperature being related to the number of red cars going by. That makes no sense, from a biological standpoint. Obviously, if we're going to run correlation analysis, we would do it with variables that would have at least some chance of having some relationship to each other. Otherwise, yeah, they would make no sense at all, you're right.

Q. And just so I'm real clear, the reason why you don't run that, or even try to do analysis on inflows and crane mortality is because you had too many steps along the way. Correct? There weren't dependent variables.

A. That's right. Because I could not say, just by knowing the amount of water that comes in, that cranes are going to die, because that's not -- it would be an indirect relationship. And that was not what I was trying to evaluate with this.

Q. When you did your dissertation, didn't you conclude that one of the major factors impacting the availability of blue crabs for the cranes was commercial crab trapping?

A. I speculated that, sir.

Q. Let's look at Page 18-19, Plaintiff's Exhibit 13. You identify, do you not, commercial crab trappers were identified as a potential problem that may affect the rate of movement of

crabs to the marshes and feeding areas of the cranes?
A. I did. Here's -- I identified them as a potential problem, as it says there. I did not actually measure it. It was my -- as I was out there, there was a lot of crab traps on occasions, along the marsh edges, a lot of crab traps, which to me could signify they could potentially intercept crabs that could end up in the marsh. So that's -- I did not actually measure that, but I speculated that too many traps at the edge of the marsh could impact the abundance of crabs in the marsh.
Q. And also, on the last line there, it's highlighted, "Elimination of crab trapping or implementing a minimum distance with setting traps may facilitate an increase of rate at which blue crabs would move to the shallow areas and become available for the cranes." What did you mean by that?
A. Well, it's the same thing. If we have crabs or crab traps very close to the marsh, they were likely to intercept crabs that could potentially end up in the marsh. However, the crabs are, the crab traps are farther away, in deeper water. I mean, they have less chance of directly cutting the flow, so to speak, of blue crabs into the marsh.
Q. Well, let's look at Defendant's Exhibit 38, which is the '08-'09 recovery report. You reviewed this, did you not, in connection with forming your opinions in this case?
A. Yes.
Q. Let's look at Page 6. "In a new management action

implemented by Dan Alonzo in February of 2009, refuge staff posted 'Closed to Crabbing' all waters within the boundary of Matagorda Island, National Wildlife Refuge, including the marshes and interior lakes. Commercial fishing has never been allowed on the National Wildlife Refuges. So this effort was simply a decision to start enforcing the law. The action should make additional blue crabs available for the whooping cranes." Do you see that?

A. Yes.

Q. Were you aware that the management at the refuge began to start -- or start -- began to enforce the law in late February of 2009 of the regulation against crab trapping?

A. After I read this report, yes, that's right.

Q. Now, prior to late February 2009, don't we know that Mr. Stehn was looking the other way and permitting illegal crab -- illegal commercial crab trapping at the refuge during the winter of 2008-2009?

MR. MUNDY: Object, that is argumentative and calls for him to speculate as to Mr. Stehn's state of mind.

MR. FERNANDES: I'll withdraw the question and move to Exhibit 36. Defendant's Exhibit 36, please. Page 2.

BY MR. FERNANDES:

Q. Do you see here, this is one of the documents that have been introduced from Mr. Stehn to Mr. Moore. "It's illegal to have any commercial fishing operations on a National Wildlife

Refuge, and we've just been looking the other way for many years." Do you see that?

A. I do.

Q. Now, in arriving at your opinion that there were food shortages during the winter of '08-'09, did you quantify the impact that illegal crab trapping had on crab abundance?

A. I did not.

Q. Did you try to quantify what, if any, impact commercial crab trapping in the area outside of the refuge had on blue crab abundance?

A. I was only measuring variables that I had measured previously, and that was not one of them, so I had no basis for comparison and therefore no reason to do it at that time.

Q. Let's talk about what happened following the winter of '08-'09. And here, let's compare two exhibits that have been previously admitted, and that is Defendant's Exhibit 6, Page 64, and Defendant's Exhibit 7, Page 66, the blue crab capture rate. Could we see that?

A. Yes.

Q. Now, during the winter of 2009, wasn't the average number of blue crabs found per survey lower than the winter of '08-'09?

MR. MUNDY: Whose, whose surveys? Could you clarify --

MR. FERNANDES: These, this is Exhibit 6, '08-'09

report. Mr. Stehn's. '09-'10 is Exhibit 7.

MR. MUNDY: I'm just asking you to clarify in the question whose surveys you're referring to.

THE WITNESS: The average is different --

BY MR. FERNANDES:

Q. Let me clarify for the purpose of Counsel. I'm sorry. We're looking at basically the annual reports from 2008, Exhibit 6, and the annual report from 2009-2010, which is Exhibit 7 on the bottom.

A. Uh-huh.

Q. And we've looked at the blue crab capture from each of those to compare abundance on those two years. Are you with me?

A. Yes.

Q. Okay. And don't they reflect that the blue crab capture rate in 2008-2009 was actually higher than it was during the winter of 2009-2010?

A. No. It only shows that during November of '08-'09 crabs were in greater abundance than in November of the previous, the next year.

Q. Do you see underneath the column where Mr. Stehn puts average 4.8, and on the bottom average 2.7? Do you see that?

A. I do.

Q. And that reflects the average capture rate, does it not?

A. Yes, except that there's a lot of zeros in one of those

years.
Q. Okay. Well, let's look at that. Because what we don't have in the year 2008 and 2009 is October numbers, do we?
A. October '08?
Q. If you look at October '08, that doesn't have the October numbers. Right?
A. I'm not sure where you're --
Q. Sure.
A. October of what, which year?
Q. Sure. If you look at the top -- you said there are more numbers in the bottom than the top. And so what I'm looking at is to see whether or not --
A. Oh, right, right.
Q. -- they both are basically reflecting abundance for the same months. Okay?
A. Right.
Q. So if you look at the top, you'll see that in October '08, he didn't measure crab -- Mr. Stehn didn't measure crab abundance in October, did he?
A. Correct.
Q. Okay. And then you go to November of '08-'09 and compare that against '09-'10, and it's 23 to 5. Right?
A. Correct.
Q. And then we get to December, and in '08-'09, you have one, and basically in December of '09-'10, you have one. Right?

A. Correct.
Q. And then you get to February of 2008-2009, and you get to February of 2009-2010, and the difference is zero and three. Correct?
A. Correct.
Q. But in February of 2008, when Mr. Stehn said zero, that's when you were out there and observed blue crabs dead, stuck in the substrate, because of the low tides and the low water levels. Correct?
A. Yeah, except it was February '09, not '08.
Q. Okay.
MR. MUNDY: What's the exhibit number?
MR. FERNANDES: 6 and 7.
MR. MUNDY: Thank you.
BY MR. FERNANDES:
Q. Let's talk about, let's compare the wolfberry abundance surveys for Mr. Stehn's '08-'09 versus '09-'10 reports. And before we do that, even though the average number of blue crabs encountered was lower in '08-'09 than '09-'10, didn't Mr. Stehn report that only whooping crane died during the winter of '09-'10?
A. Yes.
Q. Let's look at the wolfberry comparison. Again, comparison of Defendant's Exhibit 6 and 7, '08-'09, '09-'10 report. And I'll represent to you what I did on this one is, for

comparative purposes, we've highlighted the similar months from each year.
A. Sure.
Q. And if you look at that, doesn't it appear to reflect that the wolfberry count in '09-'10 was not significantly better than it was in '08-'09?
A. Yeah, in general that would be correct.
Q. And isn't it true that there were no attempts made by Mr. Stehn to survey wolfberry abundance in areas where 75 percent of the cranes reside at?
A. I cannot answer that.
THE COURT: Sure. Oh, I thought you said can you answer that.
THE WITNESS: No, I said --
THE COURT: No, you can't answer that. Sorry.
THE WITNESS: I said I cannot answer that.
BY MR. FERNANDES:
Q. Now, based upon these surveys, don't we know that wolfberries were available to the cranes during the winter of 2008-2009?
A. No, they suggest there were some fruits available in November and December.
Q. Okay. And aren't wolfberries usually gone for the year by the end of December in any one year?
A. Yes, in general, that's correct.

Q. So when you look at these visuals and you focus on these figures through December -- well, let me move on.

Now, in addition to blue crabs and wolfberries, don't we know that many other food items were available to the cranes during the winter of '08-'09 as well?

A. I don't know that.

Q. Now, in connection with your dissertation, didn't you do an energetics model?

A. Yes.

Q. To try to determine whether the cranes had a negative energy balance during the winters of '92-'93 and '93-'94?

A. I was just trying to do an energy balance, not to determine if there was a negative --

Q. Okay. Well, let me, didn't you do an energy calculation or model in connection with your dissertation to determine whether or not the cranes had a negative energy balance?

A. Yes.

THE COURT: Had what?

MR. FERNANDES: Had a negative energy balance.

THE COURT: Okay. Thank you, sir.

BY MR. FERNANDES:

Q. And you looked at it monthly to determine whether or not in any particular month the cranes may have had a negative energy balance. Correct?

A. That's correct.

Q. But in connection with your opinions in this case, isn't it true that you have not done any energetics calculation or model to determine whether the various food items that were available to the cranes during the winter of '08-'09 provided the cranes sufficient nutrition and energy?
A. That's correct.
Q. Now, let's go back to your, before we -- let me just try to get there without going to your dissertation. If whooping cranes don't have adequate energy intake during the winter --
A. Uh-huh.
Q. -- didn't you say in your dissertation that you would expect there to be delayed migration, poor reproduction in Canada, an increased mortality during the migration to Canada?
A. Yes.
Q. And isn't one of the reasons for that the point that you made I think yesterday and early this morning that these cranes migrate very quickly to Canada, in five to ten days, correct?
A. Yes.
Q. Unlike the sandhills that stop off on the way and could eat a lot of food and get some energy, these cranes make it all the way back in five to ten days. Correct?
A. Correct.
Q. And isn't that the reason why it's so important that these cranes get sufficient energy while they're at Aransas so that they can make the 2500-mile migration to Wood Buffalo?

A. And reproduce, yes.
Q. And isn't that the reason why on delayed migration you would expect delayed migration, because generally speaking, they wouldn't leave unless they felt they had sufficient energy intake?
A. Well, since I wrote my dissertation and based on what I've learned since then, I'm not sure delayed initiation of migration is an issue. The dates of initiation of migration are pretty consistent year to year, so I couldn't stand by that particular argument that I made during my dissertation. With many more years, I'm not sure that I can, I can stand on that.
Q. But you would expect, to the extent that they didn't have sufficient energy when they left Aransas, you would expect poor reproduction in Canada, would you not?
A. That would be the expectation, correct.
Q. And you certainly would expect that if they didn't have enough energy while they were at Aransas, you would have increased mortality during the migration back to -- migration to Wood Buffalo.
A. I think I've also kind of reevaluated that. The mortality events that we know of, like collision with power lines, for example, shooting, are really not influenced by body condition of birds. So at least the most common mortality events that we know of in migration -- I mean, and frankly, there are so many that we don't know. The ones that we do know about and are

most commonly reported, or have been recorded, are not related to body condition of birds. So --

Q. Well, let's look at your deposition, Pages 182 and 183.

MR. FERNANDES: Can you pull that up?

(Counsel conferring off the record.)

BY MR. FERNANDES:

Q. Do you see here when I took your deposition, I asked you, do you see in the middle paragraph, second sentence, "The shortage of resources during a critical period such as pre-migration may affect survival during migration and may affect reproduction during the upcoming breeding season." Do you see that?

Your answer was, "Yes." Right?

And I said, "Is that a true statement?"

And you said, "I believe so." Do you see that?

A. Yes.

Q. Now, if you believe Mr. Stehn's numbers, didn't only five cranes die after they left Aransas in the spring of 2009?

A. I'm sorry, do I --

Q. Sure. If you look at Mr. Stehn's numbers, didn't only five cranes die after they left Aransas in the spring of 2009?

A. Well, between April and November.

Q. Yes.

A. Yes.

THE COURT: Okay. I'm not understanding that.

BY MR. FERNANDES:

Q. Okay. After the winter of 2008-2009 --

THE COURT: Okay. Say 270 left. Is that what you're saying?

MR. FERNANDES: No, no, no, no. What happened is you had 270 at the beginning of the winter.

THE COURT: Okay.

MR. FERNANDES: According to --

THE COURT: What year is this?

MR. FERNANDES: '08-'09.

THE COURT: Okay.

MR. FERNANDES: The year in question. At the end of the year, according to Mr. Stehn's mortality numbers, you had 247, 247 by April of 2009. And then they measure mortality from April through October when they start arriving again. And so they measure migration both to Canada and back down to Aransas again.

THE COURT: And that, somebody testified, was around 8 percent.

MR. FERNANDES: Yes, that's what Dr. Archibald testified. Typically that's 8 percent. Okay. And --

THE COURT: So where does the 5 come in?

MR. FERNANDES: The 5 would represent the lowest mortality rate in 21 years. It would be 5 out of 247.

THE COURT: You mean what returned back for the 2009

fall?

THE WITNESS: Your Honor, Your Honor --

MR. FERNANDES: You can't look at it that way, because what happens is the cranes that returned back --

THE COURT: Come back with chicks.

MR. FERNANDES: Come back with chicks.

THE COURT: Okay. So what is the overall -- what are you telling me, is what I'm asking you.

MR. FERNANDES: What I'm telling you is that you would expect three things to occur, to the extent --

THE COURT: Chicks.

MR. FERNANDES: -- that the bodies had bad body thing -- body, had poor body condition. One is more would die flying to Canada and coming back. And the average rate is 8 -- if the average rate is 8 percent, and you would have to believe it's 1.5 percent after the worst year ever in '08-'09.

The second thing we're saying --

THE COURT: Say that again. I'd have to believe --

MR. FERNANDES: Sure.

THE COURT: -- what?

MR. FERNANDES: Sure. The -- again, remember Mr. Archibald, Dr. Archibald testified that in an average year 8 percent of the cranes die between the time they leave Aransas and return in the fall.

THE COURT: So if 247 left, 8 percent of those, plus

chicks should be coming back.

MR. FERNANDES: Yeah.

THE COURT: I mean 247 minus 8 percent plus the chicks.

THE WITNESS: No, no, no.

MR. FERNANDES: A better way to say it, if 247 left, you would expect 8 percent of them to die.

THE COURT: Okay.

MR. FERNANDES: Approximately 20. Instead what happened, 5 died.

THE COURT: How do we know that?

MR. FERNANDES: Because there -- because of their -- well, how do we know that? That's what Mr. Stehn's numbers reflect.

THE COURT: Well, 10 percent of 247 is 24. Right?

MR. FERNANDES: But it would be 8 percent. You would expect --

THE COURT: Right. So 22 or so. Right?

MR. FERNANDES: In the twenties.

THE COURT: Okay. And -- plus the chicks. How many -- how many came back in '09?

THE WITNESS: 22.

MR. FERNANDES: What happened was 264 --

THE WITNESS: 22.

THE COURT: 20, so no, I mean 22 chicks?

THE WITNESS: 22 chicks.

MR. FERNANDES: Yeah.

MR. MUNDY: Your Honor, might I interrupt for just -- if we had the table, it might help you visually have the columns.

THE COURT: That would be nice. Thank you.

MR. FERNANDES: And we were going to take the peak population counts. Those are the peak population counts that we showed yesterday, where you go --

THE COURT: And the 8 percent is an average. He told me that there were some years that none died or one died.

MR. FERNANDES: No, not -- this will show you the rate during the winter. Okay? So if you look at the bottom number --

THE COURT: Wait, left --

MR. FERNANDES: '89 -- if you go all the way --

THE COURT: Left, the left is the winter.

MR. FERNANDES: If you go all the way to the bottom column, 1989, work your way over the winter mortalities -- I'm sorry, April to November mortality.

THE WITNESS: It's the third column.

THE COURT: Is the left side.

THE WITNESS: The third column, Your Honor.

MR. FERNANDES: Third column to the right -- third column to the left. April to November mortality. Do you see

there for the 2009 year, it says 5?

THE COURT: 5, 2 percent loss.

MR. FERNANDES: And do you see the previous year, it was 34?

THE COURT: Right.

MR. FERNANDES: 12.8 percent. So to come up with this 8 percent, what Mr. Archibald is doing is taking all those numbers there, and he's saying on average --

THE COURT: I understood that.

MR. FERNANDES: And so following the winter of '08-'09, the percentage loss is 2 percent, which is, you know, a lot less than a typical year, when you would expect that number to be higher than 8 percent, it's actually, instead of 8 percent, it's 2 percent.

THE COURT: Why would you expect it to be higher? Because they're weaker?

MR. FERNANDES: Because they don't have the energy to --

THE COURT: Because they didn't have the poor -- okay.

MR. FERNANDES: And that's the point of what he said in his dissertation.

THE COURT: But instead they lost chicks, instead of -- you know, I mean, it could be looked at several ways.

MR. FERNANDES: Well, we're getting --

THE COURT: That instead of losing, you know, I don't know what the percentage of, in the 8 percent is juveniles.

MR. FERNANDES: No, no, there's --

THE COURT: Do you see what I mean? Juvenile versus adults?

MR. FERNANDES: It's two different -- we're going to get right into the reproduction next. That's going to be a different issue. There's like three things working here. One thing you would expect is delayed migration. You don't have it. The second thing you would expect is a higher mortality rate when they left, because they don't have sufficient energy.

THE COURT: Okay, wait. So then in fact 242 came back, plus chicks.

THE WITNESS: Yes.

THE COURT: How many chicks did you say?

THE WITNESS: 22.

THE COURT: 22.

MR. FERNANDES: And that's because there were 62 nests that winter in Canada, which was the second highest number of nests ever, which is not on that chart.

So kind of putting in perspective, you see where you see that 34 number right below it? That would show you that after a really good year at Aransas, when only one crane died at Aransas, 34 died when they left. And then after a very bad year at Aransas, when 23 die at Aransas, only 5 died. That's

what those numbers show.

THE COURT: So it couldn't show that it was just good to get out of Dodge?

MR. FERNANDES: Well, I think they were trying to get out of Dodge after '08-'09 as well, because they were, everybody says they were in good condition and they migrated early, yet 34 died during that period of time.

THE WITNESS: Just to clarify, Your Honor, the mortalities, all mortality, not just during spring -- we don't know if they died in spring migration, in the breeding grounds, or during the fall migration. I think he keeps mentioning the spring migration. But that's a composite, that's a total number for those three periods.

THE COURT: Okay.

THE WITNESS: Not just the spring migration. We don't know where they died.

MR. MUNDY: And while I appreciate Mr. Fernandes' interpretation of this chart, I would ask that the witness be allowed to explain whether or not in fact this, his theory about how many chicks are on the nests in the following year's population is accurate by the witness's testimony, rather than Mr. Fernandes' testimony, because I think --

THE COURT: But isn't that what cross-examination is about, you get to testify?

MR. MUNDY: Well, not -- I've never seen it quite to

that level, I have to confess. And I'm not trying to object to it, but I would like the witness to be allowed to address it.

MR. FERNANDES: That's what we're doing right now.

MR. MUNDY: Well --

MR. FERNANDES: That's what I was going to do.

THE COURT: That's what redirect's for.

MR. MUNDY: Well enough, Your Honor.

THE COURT: Don't worry. You get your turn.

MR. MUNDY: Well enough. Do you want me to take this down or leave it up?

MR. FERNANDES: You can leave it up.

BY MR. FERNANDES:

Q. Isn't that 2 percent mortality rate the lowest rate in 21 years?

A. (No response.)

Q. Isn't that 2 percent mortality rate --

A. Yes, yes.

Q. -- following the winter of '08-'09 the lowest mortality rate in 21 years?

A. Yes.

Q. And so in a year when, if we're to believe TAP's case, the cranes were, and I believe your opinion, they were suffering from food stress. Following that winter, we had the lowest mortality rate during migration in 21 years. Correct?

A. The numbers are correct. I still don't understand the

connection you're trying to make.

THE COURT: I got it.

BY MR. FERNANDES:

Q. Now, following the winter of '08-'09, weren't their 62 --

THE COURT: What he's saying is that the whole thing was miscounted, and those, a huge part of those 23 dead cranes ended up resurrecting in the fall of '09. That's the point he's trying to make.

MR. FERNANDES: Either they didn't die and we had the lowest mortality rate in 21 years --

THE COURT: I got it. You can testify. We can move on.

MR. FERNANDES: All right. I don't think I'm as good as Dr. Chavez-Ramirez, though.

THE COURT: I think you're good. You're going to be a crane expert. An expert witness from now on.

BY MR. FERNANDES:

Q. All right. Following the winter of '08-'09, weren't there 62 nests reported in Canada?

A. Yes.

Q. And wasn't that the second highest number of nests in the history of this flock?

A. Yes.

Q. And I believe that you've drawn a distinction in terms of whether or not, whether or not the nesting success was good or

bad, and I believe you said that your opinion is that there is a significant difference between the percentage of potential breeding pairs failing to nest in Canada in 2009 compared to years before and after 2009. Correct?

A. Correct.

Q. So what your opinion is is if you look at nesting success as a percentage of pairs, you believe it was lower in '09, in '09 than it was for the two previous years and for the following year?

A. No, that's not what I said.

Q. Okay.

A. I'm not talking about nest productivity. The numbers I'm referring to are the proportion of nesting, of pairs, of nesting pairs that actually built a nest. The number of pairs that in the past had built nests, that built nests in '09 was lower that year, the spring of '09, compared to the years before and after by about at least ten, if I recall it's ten '86 versus '94-'95. I don't remember the numbers exactly. But it is lower.

Q. Well, let's look at Defendant's Exhibit 383.

MR. FERNANDES: And we'll move to admit Defendant's Exhibit 283 (sic), which is a document that we've put together that reflects, from the evidence, the nesting success each year from 2001 to 2010. Move to admit Defendant's Exhibit 383.

MR. MUNDY: This is your summary?

MR. FERNANDES: Yeah.

MR. MUNDY: Yeah, as long as the record's clear, this is the lawyer's summary.

THE COURT: Well, I know, but are you satisfied with the underlying numbers?

MR. FERNANDES: We sent them all --

MR. MUNDY: In general, yes, Your Honor.

THE COURT: Okay. 383?

MR. FERNANDES: 383, Your Honor.

THE COURT: 383 is admitted. Thank you.

BY MR. FERNANDES:

Q. And so if you look at the numbers over ten years, what you see is the average is 88 percent. In other words, if you look at the potential breeding pairs and the number of nests from those breeding pairs, if you look at it over a ten-year period of time, isn't the average, at least reflected on this chart, 88 percent?

A. Yes. That appears -- just so I'm sure, the nest success you mean are nests built?

Q. What we've tried to -- I think --

THE COURT: What does it all mean? Tell me what it means.

MR. FERNANDES: Sure. How many potential breeding pairs actually nest? The percentage of breeding pairs that have their capability of nests, how many of them nest?

THE COURT: Okay. Like in '01, 61 out of 52 potential pairs actually nested.

THE WITNESS: No, 52 nested out of 61 potential, yes.

THE COURT: Yes, 52 nested out of 61. And out of those 52, 85 percent were successful? Or out of the 61 percent?

THE WITNESS: That was my question, too. I'm not sure what that number -- is that, is 85, 52 divided by 61, or is that success meaning produced chicks?

THE COURT: 52, out of the 52, 85 percent?

THE WITNESS: I'm not --

THE COURT: Tell me, Mr. Fernandes.

MR. FERNANDES: Well, I, in your expert report --

THE COURT: Okay. Who -- tell me.

MR. FERNANDES: Sure.

THE COURT: Find your expert out there and tell me what it means.

MR. FERNANDES: Well, we --

THE COURT: It's okay.

MR. FERNANDES: Chris, you're the expert on this one?

MR. TAYLOR: I believe it's --

THE COURT: You surely have an expert in the audience that helped you with that.

MR. FERNANDES: The reason why I said --

THE COURT: You made it up yourself?

MR. FERNANDES: This is -- Mr. Chavez-Ramirez's opinion is you shouldn't look at the total number of nests, you should look at the percentage of nesting pairs.

THE COURT: Okay, no, I just need to know what those numbers mean.

MR. FERNANDES: The 86 was in his report compared against '94, '92, '95. All we did is --

THE WITNESS: Okay. So it's --

MR. FERNANDES: -- extrapolate out. And I think with that clarification, he can help.

THE WITNESS: Okay. So 86 is basically 62 divided by 72, Your Honor. That's the same calculations I had done.

THE COURT: Okay. We're talking about '09.

THE WITNESS: Yes.

THE COURT: 62 divided by 72. And not 86 percent of the 62?

THE WITNESS: So it's -- right. So it's not --

THE COURT: That doesn't make any sense.

THE WITNESS: Well, when it says "nest success," it implies that there were chicks produced. But it's actually number of nests built. Correct.

THE COURT: 62 --

THE WITNESS: Yes.

THE COURT: -- is the number of the nests built?

THE WITNESS: Yes. Okay.

THE COURT: So each one could have had two eggs?

THE WITNESS: In general, yes, they all have two eggs.

THE COURT: I don't -- okay. I don't see the point of it.

MR. FERNANDES: Okay.

THE COURT: Explain it to me.

MR. FERNANDES: Well, Mr. Chavez-Ramirez' opinion in this case, we made the point that there were 62 nests following the winter of '08-'09, which is the second highest in the history of this flock. In the rebuttal report, he said, yes, but when you look at the potential breeding pairs and you look at the nests, the nesting success was 86 percent, which was lower than the two years before it, and the one year after.

And so what we were trying to do with this visual is show if you look at it over the ten-year period of time, it's about average, even if you look at defined, defined success in reproduction as potential number of pairs as, and number of nests.

THE COURT: Okay. But the 86 has to do with the number of chicks?

THE WITNESS: Just number of nests that were built.

THE COURT: No, 62 says number of nests. So 86 percent is what?

MR. FERNANDES: Let me --

THE WITNESS: If my interpretation is correct, the labels are kind of misleading, to some extent.

MR. FERNANDES: Okay.

THE WITNESS: Right?

MR. FERNANDES: How --

THE COURT: Because the nest success should be related to the nest. Right?

BY MR. FERNANDES:

Q. Help me out in terms of your opinion how you got to the 86 number.

A. So what I would call these columns would be, this is yes, potential breeding pairs. Those are the birds that are in the breeding grounds that could, if all was well, you could have 72 nests built, because this year there's 72 pairs with breeding capability. There were only --

THE COURT: So 144 altogether, but that's much less than what went up there.

THE WITNESS: These are pairs. Right.

THE COURT: Okay.

THE WITNESS: And so, so 62 of these 72 actually built nests. So these would be nests built.

THE COURT: Okay.

THE WITNESS: And this is the proportion of this that actually built nests, if I'm understanding this correctly, Mr. Fernandes.

BY MR. FERNANDES:

Q. So what would you call the second column?

A. I would call it number of nests built. And this is the proportion of nesting pairs.

THE COURT: So only 62 of those 72 decided to go ahead and nest.

THE WITNESS: That's right.

THE COURT: The others were waiting for the following year.

BY MR. FERNANDES:

Q. And you would call the third one just the percentage of those two columns?

THE COURT: I don't get it.

THE WITNESS: Yes. The proportion of nesting pairs. It's just the proportion --

THE COURT: Oh, okay.

THE WITNESS: It's not --

MR. FERNANDES: What percentage of pairs nested.

THE COURT: Okay. So that just means -- it does not have to do with -- nest success in that respect means --

THE WITNESS: It's just proportion.

THE COURT: -- the number of nests that were built compared to the total pairs.

THE WITNESS: That's right.

THE COURT: Not the success about having chicks or

babies or whatever.

THE WITNESS: That's right. That's what --

THE COURT: I got it.

THE WITNESS: That was why that's misleading.

THE COURT: I don't like that whole thing.

MR. FERNANDES: So we should call it percentage of nesting success is what the last --

THE COURT: I don't think I'm going to remember that.

THE WITNESS: No nesting success at all.

MR. FERNANDES: We'll let you do it on -- what we tried to do is just take your numbers and look at it over a ten-year period of time instead of over four, because you were telling us in your expert -- in your deposition that the two years before were 94, 92, and the year after was 95. So we tried to look at it over a ten-year look to see what the average was over ten years. That was the intent of this when we put together this document.

THE COURT: So what is this supposed to tell me, though?

MR. FERNANDES: Well, our position is, is that the most important thing that you look at and that you would expect after a bad year is they would have trouble in reproduction. That's what all the literature says. That's what everything says. Reproduction is usually measured by you don't have enough energy to lay a nest.

THE COURT: Let me tell you why I don't like this. And sometimes --

MR. FERNANDES: Yeah.

THE COURT: -- statistics are confusing to me.

MR. FERNANDES: Yeah.

THE COURT: Is if you had a really disastrous year, and lots of disease or whatever, and half the population of whooping cranes were killed off. 135 went up, back to Canada, and there were 60 nesting pairs, sorry, 60 possible breeding pairs and 58 actually nested.

MR. FERNANDES: Uh-huh.

THE COURT: It would be a huge percentage of success. It wouldn't tell me a thing about the damage to the whooping crane population.

MR. FERNANDES: That's our point in this case. This is, this was only an attempt to rebut Mr. Chavez-Ramirez' opinions. The opinions in our case you'll hear from our expert is the thing you ought to look at, if they don't have adequate energy when they get back, they shouldn't be able -- it's going to affect their ability to lay the nest. And what we saw is they had the second largest amount of nests in the history.

THE COURT: I don't -- I don't get it.

MR. FERNANDES: I'm sorry?

THE COURT: I think you'd best move on. I simply don't get it.

MR. FERNANDES: If two cranes go back and they're energy starved, they can't lay a nest.

THE COURT: I got it. But if ten go back and eight nest, that's an 80 percent nesting rate.

MR. FERNANDES: Yes.

THE COURT: But if all the cranes have been wiped out --

MR. FERNANDES: Yes.

THE COURT: -- and only ten went back --

MR. FERNANDES: I'll move --

THE COURT: -- only ten nesting pairs went, I mean, ten pairs went back --

MR. FERNANDES: Yeah.

THE COURT: That's why I'm saying it doesn't tell me anything. It doesn't tell me anything.

MR. FERNANDES: Well --

THE COURT: I know you want it to, but if it's not --

MR. FERNANDES: Yeah.

THE COURT: -- it's time to move on.

MR. FERNANDES: I'll move on for now.

THE COURT: I bet the Fifth Circuit will get this on first glance.

MR. FERNANDES: This is not our opinion anyway. This was an attempt to rebut one of their opinions, so --

THE COURT: I got it.

MR. FERNANDES: We don't think this works either.

THE COURT: Thank you.

BY MR. FERNANDES:

Q. All right. Let's go to your five-day visit in February. Didn't Mr. Stehn invite you to the refuge in February of 2009?

A. Yeah, it probably was in January, the invitation was.

Q. Okay. But in any event, let's go back to Exhibit 124 and just move there and go through your observations from your visit since we just covered one part of it.

First of all, if you look at F, Paragraph F, when you visited the refuge in 2009, wasn't one of your objectives to collect general observations suggestive of stress conditions of the whooping cranes?

A. Just so we're clear, this, these objectives were written after, not before I started collecting information.

THE COURT: What year?

THE WITNESS: This was '09, February of '09.

THE COURT: Thank you.

BY MR. FERNANDES:

Q. In fact, these -- this five-day visit is what forms the basis of your opinions in this case with respect to food shortages, is it not?

MR. MUNDY: Object, that misstates the testimony to a degree. This plus other evidence was the direct testimony.

BY MR. FERNANDES:

Q. Now, in this document when you -- and you made a good point. After you visited during this five-day period of time, you didn't prepare this document -- you prepared this document a number of months later, did you not?
A. That's right.
Q. And you prepared this document a number of months later so you would have an opportunity to review videotapes, look at probing and progression rates and compile data for the purposes of preparing a document for Mr. Stehn.
A. That's correct.
Q. And what you tried to capture in here, as best you could, is any observations that you found suggestive of stress conditions of the whooping crane, did you not?
A. That was not, I mean, that was mostly of the cranes feeding, what are they feeding on, what do the food resources look like. The stress conditions came after the fact.
Q. Okay.
A. After I had already been in the field.
Q. Now, in this document, you didn't report that any of the cranes looked lethargic during the winter, during your visit, did you?
A. I don't think I can tell a lethargic crane from this.
Q. And you didn't report, did you, that any of the cranes looked emaciated?
A. No.

Q. Let's talk about E, Paragraph E. Didn't you collect feces and do a stress test to try to determine if the cranes were under any stress?
A. It's not a stress test. It's -- we're trying to evaluate the level of stress hormones in feces.
Q. What would you call it? A stress analysis?
A. Stress hormone analysis.
Q. And aren't the results of that stress hormone analysis reflected in Plaintiff's Exhibit 20? Could you pull up, could you pull that up?
A. Yes.
Q. And if you read that, do you see, it says, does it not, corticosterone levels did not indicate whooping cranes were stressed, as compared to sandhill cranes. However, more research is needed to determine the species specific baseline stress hormone levels before conclusive statements can be made using this technique. Do you see that?
A. Yes.
Q. Now, after this document was created, didn't you collect feces of whooping cranes from different years to try to determine baseline stress hormone levels for whooping cranes?
A. The following winter, yes, we collected more feces.
Q. And haven't you had that data for a number of months?
A. I don't have it, no.
Q. Well, isn't it true that you haven't completed the

analysis of the data to determine whether it would show that the cranes suffered stress during the winter of '08-'09?
A. We don't -- stress hormone analysis on a species for which you don't know the normal levels -- and we don't for whooping cranes, obviously -- we thought we might be able to compare relative levels of stress hormone, let's say, Matagorda versus Aransas versus Lamar. We don't know, for example, what 50 versus 100 means, for example. Does that mean 50 percent more stress? We really don't know what that is. This is a very preliminary, can we -- first of all, can we do it? Is there relative differences? But the actual numbers at this point in time regarding whooping cranes specifically cannot, I cannot interpret the data in a way that I can tell you "yes" or "no" they were stressed. If the normal levels of whooping cranes is 10, then all these cranes are stressed. If the normal levels for a whooping crane is 100, some are stressed. If it's 150, then none are stressed. So I do not know that.
Q. Didn't Mr. Stehn report that the feeders provided a supplemental boost of calories to 20 percent of the flock?
A. I'm sorry, could you repeat?
Q. Let me go at it this way. Isn't there a pair of cranes that you believed were not suffering food stress when you went out there?
A. A pair --
Q. Because they eat at game feeders every day?

A. Oh, right. Yes, there was.
Q. And didn't you compare feces from the pair that was known to be eating from those game feeders against feces from cranes from other areas?
A. We -- yes, we -- yes, those would be the Lamar birds.
Q. And did you find that there was no discernible pattern of stress between cranes known to be using feeders and cranes from other areas of the refuge?
A. Again, not knowing what the baselines are, I cannot -- there's differences. What they mean, I cannot say.
Q. Let's talk specifically about your opinions in this case regarding alleged food shortages during the winter of '08-'09.
MR. FERNANDES: Can you put up TAP 384? I'm sorry, Defendant's Exhibit 384.
BY MR. FERNANDES:
Q. Now, aren't these your opinions in this case regarding evidence of food shortages?
MR. MUNDY: Is -- can we take this down for a moment --
MR. FERNANDES: Sure.
MR. MUNDY: -- while I confer with Counsel?
(Counsel conferring off the record.)
MR. MUNDY: I think we have a solution, perhaps.
BY MR. FERNANDES:
Q. Let's talk about your -- let's talk about your specific

opinions regarding alleged food shortages during the winter of '08-'09. And first, your first opinion is that delayed juvenile molting in 2008-2009 demonstrated a juvenile suffered extraordinary food shortage. Correct?

A. Yes.

Q. Now, when you visited the refuge in February 2009, didn't you take photos of the cranes?

A. Yes.

Q. And didn't you also make digital recordings of the cranes?

A. Yes.

Q. And didn't those photos and digital recordings include pictures of the juveniles that you observed in February of 2009?

A. Yes.

Q. And weren't all those photos and digital recordings maintained on your computer at The Crane Trust?

A. Not my computer, the project computer.

Q. At The Crane Trust computer.

A. Correct.

Q. And weren't you the executive director of The Crane Trust?

A. Yes.

Q. And weren't those photos and video recordings in existence when you left your position as executive director of The Crane Trust?

A. Were they what? I'm sorry.

Q. Were they in existence?
A. As far as I know.
Q. And didn't you learn that TAP was considering filing an Endangered Species Act --
MR. MUNDY: Excuse me, I'd object. This goes to the motives of the Plaintiff in bringing the litigation. He is not -- that's way beyond the scope of the examination of this witness.
MR. FERNANDES: This goes directly to the issue of our motion to exclude, which is not on spoliation, even though they responded with a spoliation response. We have a motion to exclude under Rule 37. All of the tapes and the pictures that form the basis of three or four of these five opinions were destroyed after, at some point in time after Mr., Dr. Chavez-Ramirez left The Crane Trust. And what we're trying to establish is nine months before he left The Crane Trust, TAP had filed the lawsuit. He was already talking to TAP's executive director about the observations in this very document. They knew that basically that when you looked at Exhibit 124, it reflects that all those opinions were based upon his review of videotapes, and during that nine-month period of time, nothing was done to preserve those tapes. So now four out of these five opinions, we don't have the underlying data to look at to question the witness. That's what we're trying to establish with those questions.

MR. MUNDY: Mr. Irvine?

MR. IRVINE: Your Honor, yes --

THE COURT: By a microphone, please.

MR. IRVINE: I apologize, Your Honor. We did file a written response to that motion of Mr. Fernandes to exclude that data, and I think, as we made it quite clear then, TAP had absolutely no control, custody or possession of those tapes. And Mr. Chavez-Ramirez was not retained in this case until March of 2011, when he started working for us. So that was four months after he left The Crane Trust. We believe that there's no evidence that the tapes have actually been destroyed.

THE COURT: Did you destroy the tapes?

THE WITNESS: No, ma'am. And by the way --

THE COURT: Okay. Do you know what happened to them?

THE WITNESS: And by the way, they're not tapes. They're digital recordings. There's no --

THE COURT: Have they been recorded over?

THE WITNESS: There's no tapes. I have no idea.

THE COURT: Okay. Where were they when you last saw them?

THE WITNESS: They were in a computer that we have for The Whooping Crane Project.

THE COURT: Okay. Who has that computer now?

THE WITNESS: The Crane Trust.

THE COURT: The Crane Trust? Did you try to get them from The Crane Trust?

MR. FERNANDES: Yes. And the response that came back is the one that we submitted, and that is --

MR. TAYLOR: Defendant's Exhibit 62.

MR. FERNANDES: I'm sorry?

MR. TAYLOR: Defendant's Exhibit 62.

THE COURT: Sorry?

MR. TAYLOR: Defendant's Exhibit 262.

THE COURT: Stand up if you want to speak.

MR. TAYLOR: All right.

MR. FERNANDES: Defendant's Exhibit 62.

THE COURT: Are you an attorney?

MR. TAYLOR: Yes, Your Honor.

THE COURT: Okay. Thank you. So tell me --

MR. FERNANDES: If we --

THE COURT: Okay.

MR. FERNANDES: Can you pull that up so we can see it?

THE COURT: Got it. Hold on.

MR. FERNANDES: Pull that up so we can --

(Counsel conferring off the record.)

THE COURT: Have you been in touch with The Crane Trust to see where those videos might have been?

THE WITNESS: I talked to, yes, one person there, and

I explained to them where I --

THE COURT: Where you put them?

THE WITNESS: -- last knew about them. And that was it. They looked, as far as I know. They reported to Mr. Irvine directly, not to me at that point, but --

THE COURT: They didn't have it?

THE WITNESS: -- I tried to give them information as to where they would be, as far as I knew.

THE COURT: All right.

MR. IRVINE: Both parties have made a good faith effort to obtain these tapes, and we simply get the same response back from The Crane Trust.

MR. FERNANDES: The issue that we have is he was designated in March of 2011, but a year earlier, he was in discussions with TAP's executive director concerning Exhibit 124, and that's the observations that form the basis of this, all of these opinions. That document, Exhibit 124, specifically says he determines food capture rate and probing rates from viewing videotapes. So everybody knew that these tapes were out there nine months -- they got those the same month that this lawsuit was filed. And the point that we made in our motion --

THE COURT: Do you have any evidence to show me that someone intentionally destroyed those records?

MR. FERNANDES: No, and that's why, on our motion, we

did not move to exclude it under spoliation. Their response is a spoliation response. Our motion to exclude it was under Rule 37 for failure to produce information that an expert opinion is based upon. And no, we don't have evidence that it was intentionally destroyed, in response to your question.

THE COURT: All right. The motion's denied. Thank you.

MR. FERNANDES: Thank you, Your Honor.

THE COURT: But I'll take that into consideration.

MR. FERNANDES: Thank you, Your Honor.

THE COURT: That fact that they're not there.

THE WITNESS: Could we take a break?

THE COURT: He wants a break. Fifteen minutes.

MR. FERNANDES: Thanks.

THE WITNESS: Thank you.

THE COURT: Yes. Sorry.

(Recess from 2:54 p.m. to 3:16 p.m.)

THE COURT: Thank you. You may be seated. You can be seated. Thank you. All right. You almost done?

MR. FERNANDES: Not too far away.

THE COURT: I really was kidding you.

MR. FERNANDES: I promise you the rest of the witnesses are going to go real quickly from our side.

THE COURT: Go ahead.

BY MR. FERNANDES:

Q. Let's get to your first opinion, the delayed juvenile molting. First, when you say that your -- first, when you say in your opinions that your observations are indicative of food shortages, what specific food items are you referring to?
A. Well, I'm assuming just the broad based food -- if you look at the diets from previous reports, crab, wolfberry, any of the other water dependent organisms that could be out there, clams, snails.
Q. Okay.
A. I mean, obviously you cannot measure them, so I can't address which ones are missing.
Q. I'm just -- the reason why I question, all of your opinions in this case say that, for example, delayed juvenile molting demonstrated that the juveniles suffered extraordinary food shortage, and I just want to be clear for the purpose of that opinion what food items are you referring to.
A. Feather growth is dependent on food. I can't say what food they need for that. Any amount of food -- more food, more feather growth. Less food, less feather growth. That's what I'm basing it on. I'm not basing it on the abundance of any particular food in the environment, because I don't know.
Q. Let's talk specifically about your opinion regarding the delayed juvenile molting, Plaintiff's Exhibit 20. Can you pull that up, please, the photos? In Plaintiff's Exhibit 20, it says, "Photos of the whooping crane chicks at Aransas National

Wildlife Refuge, Texas, in February 2009 and March of 2007."
So the February photo is February 2009. Correct?
A. That's right.
Q. And the photo on the right is in March of 2007. Right?
A. That's right.
Q. So is it your opinion that the delayed juvenile molting demonstrated food shortages, based upon your review of this photo to the left, which was in February of 2009, and the photo to the right, which is in March of 2007?
MR. MUNDY: Object, that misstates his prior testimony about the entirety of the game camera sequence photos we went over earlier. So it misstates the testimony of the witness, Your Honor.
THE COURT: Sustained.
BY MR. FERNANDES:
Q. When you made your presentation --
THE COURT: No, actually he can answer that. He's going to know whether it is or it isn't.
THE WITNESS: No, it was based on many more photos than just these two.
BY MR. FERNANDES:
Q. Okay. Well, how many photos did you compare against the crane, the picture of the crane from March of 2007?
A. Well, I can't, I can't say right off the top of my head. A dozen, fifteen maybe.

Q. And let's pull up 168 for a minute, please. Well, let's move on.

Don't the feathers of juveniles get whiter later during the winter?

A. Yes.

Q. Let's go back to PX 20. So we have this photo in February on the left and the photo in March on the right. Wouldn't you expect the juvenile that's in the February photo on the left to have fewer brown feathers in March?

A. Yes.

Q. Aren't there 715 photos from the feeders during the winter of 2008-2009?

A. Something in that range, yes.

Q. Aren't there numerous photos of juveniles from February of 2009 that appear much whiter than this juvenile on this photo to the left?

A. I can't say that right off the top of my head at this point.

Q. Well, let's look at Defendant's --

A. There is some various, obviously.

Q. I'm sorry. Let's look at Defendant's Exhibit 194, TS20849. And this is a photo taken from the feeders on February 22nd, 2009, the same date as the photo of the juvenile that you used for the purposes of this opinion.

Now, let's compare this photo taken from the feeders on

February 22nd, 2009, with the photo taken from March of 2007. Doesn't the photo of the crane from February of 2009, February 22nd, appear to be much whiter than the crane to the right that was taken on March of 2007?

A. Much whiter? I don't think so.

Q. Well, have you at least tried to compare a crane from March 2009 to a photo taken, to your photo taken from March of 2007? In other words, have you at least tried to compare photos of cranes whose pictures were taken the same month?

A. The pictures we looked at this morning, or whenever it was, were from March.

Q. Well, just one of them. Correct?

A. No, all --

Q. If I can recall.

A. All of them.

Q. What is your sample size? Two, three?

A. I think it was more like -- well, and unfortunately, we don't know if it's the same chicks coming back, so five, ten --

Q. Because when we look at these, we don't know if it's a photo of the same chick or not, do we?

A. Unless they're different -- yeah, that's right. Okay.

Q. And so you really don't know what your sample size is, do you, with respect to the juveniles that you're looking at from February '09 versus this juvenile from March of 2007.

A. That's right.

THE COURT: You mean that could be the only one that looked whatever?

MR. FERNANDES: Yes.

THE COURT: Okay. And they all else could look something different?

MR. FERNANDES: Yes, Your Honor.

THE COURT: Got it.

BY MR. FERNANDES:

Q. Isn't it true that you're not aware of any study that says that the rusty coloration on the juvenile body is almost gone by February?

A. Is -- I'm sorry?

Q. Sure. Isn't it true that you're not aware of any study that says the rusty coloration on the juvenile body is almost gone by February?

A. Oh --

Q. In any given year?

A. That's correct.

THE COURT: Can I tell you how I interpreted his testimony, and then you can --

MR. FERNANDES: Sure.

THE COURT: -- find out where you ought to go. I understood his testimony, when he first saw the chick in the winter of '09 --

MR. FERNANDES: Uh-huh.

THE COURT: -- he thought, "I wonder if this is delayed molting." So he went back to look for others. He didn't testify about any study, any anything. It was just his own observations. And that was his, he wanted to know if possible feeding habits could delay the molting. Is that what you were telling me?

THE WITNESS: Yes, Your Honor.

MR. FERNANDES: And literally, a couple of questions, I'm just trying to establish that the studies show that they change colors at different points in time. And that's where I was going.

THE COURT: I think he told me that. They start out really brownish.

MR. FERNANDES: Okay.

THE COURT: And they get lighter as the season goes by. I imagine that he could tell me that some don't get a lot lighter.

MR. FERNANDES: That's what I was trying to get at.

BY MR. FERNANDES:

Q. Is there a variation that some of the cranes get lighter at different times during the winter than others?

A. Very likely. I mean, I haven't said that I've studied in detail until these pictures, but my expectation would be the same. Those that are lighter have better food resources that winter than those that are darker, at the same -- assuming it's

the same time period.
Q. From reading Allen, don't we know that he suggests there's a tremendous variation among individual juveniles and the timing of the molt, making it difficult to state definitively what juveniles probably should look like in February or March?
A. Yes. And again, the differences between juveniles would have to, based on feather growth, related to food resources.
THE COURT: What were you reading from? I missed that.
MR. FERNANDES: Allen 1952, the publication I objected to.
THE COURT: A little prematurely, I guess.
MR. FERNANDES: Prematurely.
BY MR. FERNANDES:
Q. Just so we're real clear in terms of what changes first, the first thing that changes is their body, correct, not their head or their neck?
A. Right.
Q. And the last thing to change is their neck and their head. Correct?
A. That's right.
Q. And in fact, some years -- or actually many years, or most years, many of the juveniles, even when they leave Aransas, still have some brown on their neck and their head, don't they?
A. Yes.

Q. Let's talk real quickly about your opinions about food seeking behavior. Let's go back and look at Exhibit 124, which are your document reflects your observations from your visit of February 2009. Turn to Page 3. Is it your opinion that probing and progression rates demonstrated food shortages, based upon this table?

A. Yes. The number of probes observed, for example, in February '09 is much lower than those in the previous years that I had sampled.

Q. In here, aren't you comparing data from five days in February 2009 with data across two winters?

A. Yes.

Q. And don't foraging choices and foraging behaviors of whooping cranes vary across the winter?

A. Yes.

Q. And aren't you comparing data from a period of time when blue crabs aren't very abundant, which is in February of 2009, across data from -- against data across two entire winters?

A. I'm sorry, could you repeat the question?

Q. Aren't you comparing data from five days in a month when blue crabs are generally not abundant with data across the entire winters?

MR. MUNDY: Repetitive from the earlier cross-examination, Your Honor.

THE WITNESS: Well --

MR. FERNANDES: Not with respect to probing. We were talking about food capture rate opinion.

THE COURT: Go ahead.

MR. FERNANDES: Which is different from his probing.

THE WITNESS: Yes, but just to clarify this graph, if we're talking about blue crabs only, that would be the salt marsh primarily that I would look at. So bay and uplands would not be connected to blue crab foraging, for the most part.

BY MR. FERNANDES:

Q. Now, if you were asked to design a study, you would never compare data from five days in February of 2009 with data across an entire winter, would you?

A. If you were going to do an ideal study, of course not.

Q. And if you wanted to do a study comparing food seeking behavior between the winter of '08-'09 with the winter of 1992-'93, wouldn't you want to use data from the entire winter of 2008-2009?

A. Yes, if you're planning to design the study ahead of time, yes, it would --

Q. Wouldn't you rather use the same data that you had when you were doing your dissertation, and that is data from across an entire winter, '92-'93, and data from across an entire winter, '93-'94, and compare that for the purposes of your analysis?

A. Yes.

Q. And then after that, what you did in connection with your dissertation, then you performed the statistical analysis in addition to that. Correct?
A. That's correct.
Q. And you've performed no statistical analysis here to determine whether or not there's a statistically significant difference between the probing and progression rates in February 2009 with the prior years of your study. Correct?
A. I did no statistics. That's correct.
Q. Let's go -- and even in your dissertation, when you look at these two years, what you call a good year and a bad year, when you look in your dissertation, you found, did you not, that there was no statistical significant difference between the probing rates in what you call a good year and a bad year. Correct?
A. That's correct.
Q. Let's talk about your opinions with respect to food consumption rates, PX 20, Table 1. And this is the one we've already talked about.
A. Uh-huh.
Q. Now, didn't you review video recordings to calculate your February 2009 food capture rates?
A. The February --
Q. That are reflected here.
A. February 2009?

Q. Yes.
A. And some direct observations, yes.
Q. And didn't you also review those videotapes to arrive at your opinions with respect to the progression and probing rates in this case?
A. Yes.
Q. Let's talk about your next opinions with respect to food shortages break up -- break down the family unit. Let's go to Exhibit 124, Pages 2 and 3. Now, aren't these two observations indicative of food shortage that you reported to Mr. Stehn, juvenile molting that we discussed and the foraging behavior with respect to the cranes?
A. Yes, that appears to be that.
Q. And when you reported the observations indicative of food shortage to Mr. Crane (sic), you never mentioned anything about the breakdown of the family units or crane movements away from their territories. Correct?
A. I do not recall that, no.
Q. Okay. Well, let's just talk about your opinion here with respect to parents refusing to feed their chicks. Isn't your opinion that parents refuse to feed the chicks based upon your observations during the five days that you were at Aransas?
A. I'm sorry?
Q. Sure. Those observations about the parents refusing to, feeding chicks, they were based upon five days of observations?

A. That's correct.
Q. And wasn't that behavior observed likely reflected on the videotapes, or the digital recordings?
A. No. That's something I observed directly.
Q. Let's look at Page 202 of your deposition. Do you see here where I asked you, "So this behavior that you just mentioned should be reflected in the video recordings."
MR. FERNANDES: You'll have to go up a little bit more. The Q&A before. Just open it up. Let's just move on.
BY MR. FERNANDES:
Q. During your five-day visit, didn't you only observe this behavior of a parent refusing to feed its chick with two different family groups?
A. That's right.
Q. So during your five-day visit -- I'm sorry -- so your sample size was two crane families. Correct?
A. Well, I made two observations.
Q. And weren't there more than 70 crane families during the winter of '08-'09?
A. Yes.
Q. And weren't both families that you observed on the refuge property?
A. Yes.
Q. And isn't it true that only approximately 25 percent of the cranes live on the refuge property?

A. Yes.
Q. And isn't it true that you didn't do anything to determine --
THE COURT: Say that again.
MR. FERNANDES: Sure.
BY MR. FERNANDES:
Q. Isn't it true that only approximately 25 percent of the cranes live on the refuge property?
THE COURT: Is that right?
THE WITNESS: Oh, yes.
THE COURT: Thank you.
BY MR. FERNANDES:
Q. Because that doesn't include, for example, Matagorda Island, Lamar Peninsula, San Jose Island --
A. That's correct.
Q. -- and the other territories.
A. That's correct.
Q. And isn't it true that you didn't do anything to determine whether your observations applied across the entire winter range during 2008-2009?
A. That's right.
Q. And isn't it also true that you never saw a juvenile being pushed or ejected off its territory?
A. That's right. I never --
Q. And from territory to territory, food sources differ from

territory to territory?
A. You would expect some variability among territories.
Q. Let's talk about your observations, your opinions with respect to juveniles observed alone without their parents. Isn't it true that you can't tell us how many juveniles you saw, you observed alone, because you could have observed the same juvenile a number of times?
A. Yes.
Q. For example -- and isn't it true that you didn't do anything to determine if your observations of solitary juveniles applied across the entire winter range during the winter of '08-'09?
A. That's correct.
Q. And haven't juveniles been observed without their parents in prior years?
A. Yes.
Q. Let's talk about your opinion that cranes are forced to fly to fresh water when salinities are in the range of 15 to 23 parts per thousand. And I believe you said that cranes drink fresh water, when they're drinking fresh water in their marsh, they're drinking water that, by definition, is not fresh water?
A. That's right.
Q. It's --
A. Sure.
Q. There's salinity in it.

A. It's a salt marsh, correct.
Q. So the question is, and your opinion is at what threshold of salinity -- your opinion is that at a certain threshold of salinity, the crane then has to leave the salt marsh and go to a fresh water pond and drink fresh water?
A. Correct.
Q. And your opinion is, is that occurs, begins to occur when salinity levels reach 15 parts per thousand. And then when it gets to 23 parts per thousand, they all have to go.
A. Yes.
Q. Let's look at Defendant's Exhibit 123. I think we previously talked about this is Mr. Stehn's article of Mr. Taylor, and do you see, "Their movements also increase when cranes are forced to fly to fresh water ponds to drink when marsh salinities exceed 23 parts per thousand"?
To try to streamline this, this opinion is not based upon Allen or Hunt, is it?
A. Not to my knowledge.
Q. It's based upon your observations and Mr. Stehn's observations.
A. Well, my -- I can speak for my observations.
THE COURT: He can -- I think he's right. Let him talk to his observations.
MR. FERNANDES: That's all I'm going to do.
THE COURT: That's why we've got Mr. Stehn here.

MR. FERNANDES: Now I have it, I have that section cut out.

THE COURT: Does that help?

MR. FERNANDES: It does.

THE COURT: You're too kind. You're not really in a position to argue.

MR. FERNANDES: No response.

BY MR. FERNANDES:

Q. Isn't it true that you're not aware of any publications that support the proposition that cranes need to seek fresh water to drink when salinities reach certain salinity thresholds?

A. That's right.

Q. Let's talk about your observations.

A. I am aware of publications that say they do go to drink water, though.

THE COURT: Pardon?

THE WITNESS: There are some publications that mention cranes craving fresh water, even though they don't have a threshold of salinity measured within the publication.

BY MR. FERNANDES:

Q. Don't your observations come from two winters, '92-'93, '93-'94 when you were doing your field work in connection with your dissertation?

A. No, they come from many more years. I was, when I was

doing my dissertation, I was not specifically out there to look at that issue. I just happened to be collecting information that over the years suggested to me that threshold. So no, not only during that time period.

Q. Isn't it true that you never tested the salinity levels and then followed a particular crane to the fresh water pond and observed it drinking water?

A. I never did it at the same time, no.

Q. Now, if you were to design a test to test your hypothesis that you gained from your observations that cranes need to seek fresh water at 15 to 23 parts per thousand, wouldn't you at least have to test and reject alternative explanations?

A. Such as?

Q. Well, wouldn't you have to test and reject why few or no cranes were observed at the ponds when salinity levels greatly exceeded 23 parts per thousand?

A. I'm not sure what you're referring to.

Q. Well, we'll save that for the next witness.

Wouldn't you have to test and reject whether some of the cranes were going to the ponds to get food?

A. Well, just to clarify, I'm confused by what you're asking, because until -- most ponds are not monitored. Tom sees things when he flies, but Tom flies by a pond for a few seconds every flight. So I'm not sure what you're talking about --

Q. Okay, sure.

A. -- cranes not being observed in ponds.
Q. Sure. Haven't you observed cranes eating at the ponds in the uplands?
A. I have.
Q. So --
THE COURT: At the ponds at the --
MR. FERNANDES: In the uplands.
THE COURT: Okay.
BY MR. FERNANDES:
Q. So when you see a crane in the uplands, isn't it possible the crane is eating, as opposed to drinking fresh water?
A. 99 percent of my observations of cranes at fresh water ponds are drinking. I have seen foraging activity, but very little. So I would say drinking is the primary reason. An opportunistic foraging of any food items they would encounter, I would say yes, they would definitely go for it.
Q. Let's talk about the use of aerial surveys to establish the whooping crane population counts. Let's look at Defendant's Exhibit 385. Let's talk about how peak population counts are done each year, and this in connection with the years that you were flying in '92-'93, '93-'94, in connection with your opinions in this case.
What we've tried to do to move this along is we've looked at each of the aerial surveys, and that's Defendant's Exhibit 385. And they reflect each of the aerial surveys during the

year 2008-2009. And the round circle on the bottom is the cranes that were actually observed in connection with that particular aerial survey.

A. Uh-huh.

Q. And the number in the box is those cranes that Mr. Stehn estimated to be present, based upon that aerial survey. And so you'll know what this is in those lines, those six lines you see there underneath those boxes, those are the six aerial surveys that we've previously discussed with Mr., Dr. Archibald, were deemed to be reliable. Are you with me?

A. I'm sorry, the part about deemed to be reliable is based on what?

Q. Well, we can go look at Exhibit 6, Page -- I believe it's, what, 12? The '08-'09 report.

(Counsel conferring off the record.)

MR. MUNDY: As long as the record's clear, this is a lawyer-created summary of it.

MR. FERNANDES: Yes.

MR. MUNDY: Yeah.

MR. FERNANDES: Yes.

THE COURT: What's the number?

MR. FERNANDES: 385. Move to admit.

THE COURT: Any objection?

MR. MUNDY: No, as long as it's clear this is the lawyer-created summary.

THE COURT: Okay.

MR. FERNANDES: Well, instead of the six reliable, we'll leave that for the next witness.

BY MR. FERNANDES:

Q. There were eleven -- these were the number of aerial surveys conducted during the winter of '08-'09, correct, based upon your review of the data in connection with your opinions?

A. As far as I know, yes.

Q. And what we had is 11 different flights. Correct?

A. Yes.

Q. And what happened is on each of the flights -- we can go, and we'll go with the next witness and we'll look at the individual surveys, but Mr. Stehn reports observing a certain number of cranes, and then he estimates how many cranes are at the refuge. Correct?

A. Yes.

Q. And so don't these aerial surveys then represent a series of repeated incomplete counts?

A. Well, Tom Stehn is going to address this issue, I would think.

Q. Well --

A. Or should I?

Q. The reason why I'm addressing it with you is because you have rendered an opinion in this case they're reliable. We have talked to you about these issues before, and I want to do

it briefly, before --
A. Okay.
Q. -- I address it with Mr. Stehn.
A. Okay, so could you repeat the question?
Q. Sure. Let me get at it this way. Isn't it true that you're not sure how Mr. Stehn estimates that there are more cranes than he actually observes?
A. I'm not sure I can --
MR. MUNDY: I object to that question as unclear.
MR. FERNANDES: Sure.
MR. MUNDY: And I don't think there's such testimony.
MR. FERNANDES: There's direct testimony, and let me --
THE COURT: Well, let's get it from Dr. Stehn. I told you before, if you need to re-call somebody else, you can do it.
BY MR. FERNANDES:
Q. Just so we're clear, for the purposes of the opinions that you did render in your direct examination, you talked about numbers widely used by a number of --
THE COURT: Could you stand by the microphone? Thank you.
BY MR. FERNANDES:
Q. -- numbers used in publications have been relied upon by a number of publications and a number of different entities. Do

you recall that testimony?
A. Yes.
Q. Weren't you talking about aerial census being used to establish peak population counts?
A. The vast majority of information utilized for a lot of analysis has been population and mortality.
Q. Because, for example, this methodology, a series of counts to come up with peak population number, this leads to a peak population count in any particular year. Correct?
A. Yes.
Q. For example, and 270 was 2008-2009. Then it went from 270 to 264 to 283 to 300. Correct?
A. I don't know that it's got to 300, as far as I know.
Q. And that methodology is important when you're monitoring an endangered species, because it helps you determine the trend of the population?
A. Yes.
Q. So just so we're real clear in this distinction, that's a peak population count. Now let's talk about missing equals dead methodology. All of these publications that you say rely upon Mr. Stehn's numbers, aren't they relying upon the peak population counts?
A. Not all of them.
Q. Aren't virtually all of them except the two that are coauthored by Mr. Stehn?

A. No. I'm aware of some mortality evaluations done by other folks.
Q. Whose other methodology are you aware of that relies upon the missing equals dead methodology, as opposed to the peak population count methodology?
A. The missing equals death versus what? I'm sorry.
Q. Well, let me go at it this way. Peak populations are determined by doing repeated flights. Correct?
A. Correct.
Q. We'll talk to Mr. Stehn, but the number he got for 2008-2009 was 270 from doing these repeated flights. Correct?
A. Correct.
Q. But when you were talking about mortality, it's not based upon 11 repeated flights, is it?
A. Mortality is based on repeated flights? I'm not sure --
Q. Let me ask the question again. On the population counts, Mr. Stehn's use of aerial surveys to establish mortality is not based upon the technique of counting birds on repeated flights over the winter, is it?
A. I still don't understand what you're asking, sir.
Q. Sure. Peak population counts are based upon a series of flights over the course of the winter, and you determine what the peak population is. Correct?
A. Yes.
Q. Mortality is based upon if Mr. Stehn flies over a

territory and sees an adult pair but no juvenile, doesn't he presume that the juvenile is dead if he has previously seen the juvenile in the territory?

A. Okay. Um --

THE COURT: You probably need to ask him that. That's the deal.

MR. FERNANDES: It's --

THE COURT: Because the whole issue, the reason I brought Dr. Stehn here, or Mr. Stehn, was because everybody's reports rely on his mortality figures.

MR. FERNANDES: Yeah.

THE COURT: So you need to ask him how he gets them.

MR. FERNANDES: I was -- I'm sorry. I was trying to be extremely brief, because he did answer these questions in a deposition. I have no idea what Mr. Stehn's going to say or not, because we didn't have the benefit of his deposition.

THE COURT: Why don't we find out, and then you can go back and talk to some of these witnesses and say --

MR. FERNANDES: Okay.

THE COURT: -- would this, you know, if you find out X, would that change you to Y?

MR. FERNANDES: All right.

THE COURT: And I know it's a little unusual, but I think Mr. Stehn's testimony would assist the Court in this matter. You all both tried to subpoena him, with no luck, and

I succeeded.

MR. FERNANDES: The only issue I have now is I do have to go through the Daubert line of questions, because he is the expert being offered to support these mortality numbers.

MR. BLACKBURN: Excuse me, Your Honor. I mean, we have asked that Tom Stehn be qualified as an expert as well. And we certainly will offer him to support those mortality figures as well, assuming he does, which like Mr. Fernandes, we --

THE COURT: He just may get on the stand and say, "I made them all up."

MR. BLACKBURN: He may. And if he does that, I think we're -- forget about Daubert.

THE COURT: Uh-huh.

MR. FERNANDES: Yeah. Is Plaintiff's Counsel prepared to withdraw him as their mortality expert then?

MR. BLACKBURN: No.

MR. FERNANDES: Otherwise, I have to go through these questions. That's the dilemma I'm in.

THE COURT: Well, the mortality expert is all -- his testimony is all based on Mr. Stehn's figures, so I don't know why he should be offered as a mortality expert. You know, I don't see anything wrong with him saying, yes, these are my mortality figures based on Mr. Stehn's records, which is what he's said all along. But the point is, they all rely on

Mr. Stehn's records. Everybody that's testified so far, their mortality predictions, or mortality rates were Mr. Stehn's rates.

MR. FERNANDES: I understand that. But they're not withdrawing him as their expert on --

THE COURT: I'm not -- I'm not going to grant the withdrawal either. I'm not going to disqualify him as a mortality expert, as far as using the underlying statistics of Mr. Stehn. I don't think there's any problem with that. That's why I brought Mr. Stehn here.

MR. FERNANDES: Uh-huh.

THE COURT: So you could attack those underlying -- that's what you've been trying to do all along. I thought it would be a great bonus for you to have him here and attack those, the way he does it in person.

MR. FERNANDES: Okay.

THE COURT: Instead of in absentia.

MR. FERNANDES: We'll go at it that way. Let me just close with this. Let's look at Defendant's Exhibit 7, Page 66.

THE COURT: You're a quick study, Mr. Fernandes.

MR. FERNANDES: Exhibit 7, all the way at the bottom, and up a little.

BY MR. FERNANDES:

Q. Before we do that, just so I, if I understand your theory, is it your -- one of your opinions in this case is when there

are food shortages in the salt marshes, that the cranes go to the uplands and there's an increased risk of predation in the uplands?

A. Yes.

Q. Okay. Let's look at Exhibit 7 --

A. But also, it's not just because of food shortages, but also because of high salinities in the marshes. They would go --

THE COURT: Because of what?

THE WITNESS: High salinities in the marshes that they would also go to uplands.

THE COURT: Okay.

THE WITNESS: Not just foot shortages.

BY MR. FERNANDES:

Q. All right. Let's look at Defendant's Exhibit 7, Page 66. First of all, let's go to Page --

THE COURT: Stand by the microphone.

MR. FERNANDES: Sure.

BY MR. FERNANDES:

Q. First, let's go to Defendant's Exhibit 7.

THE COURT: Y'all need to tie him to the podium.

BY MR. FERNANDES:

Q. Have you -- and you reviewed this end-of-the-year report in connection with your opinions in this case, did you not?

A. I've read it, yes, sir.

Q. Let's look at Page 66. And Table 66 shows, does it not, the cranes' use of the uplands during the year '08-'09, compared against the use of the uplands during the year '09-'10, does it not?
A. Based on the aerial surveys? Is that -- if I believe that's what we're looking at.
Q. And doesn't it show that the cranes' use of the uplands in '09-'10 was almost three times greater than the use of the uplands in '08-'09?
A. I can't say that. This is the number of observations that Tom would have seen birds in uplands. If I was going to --
THE COURT: Is this your, is this your thing?
THE WITNESS: No, it's Tom Stehn's.
THE COURT: Did you use this to come up with an opinion?
THE WITNESS: Not in that regard, ma'am.
MR. FERNANDES: Well, he did --
THE COURT: That's okay. Go ahead.
MR. FERNANDES: He did --
THE COURT: I just -- I'm straightening it for myself.
MR. FERNANDES: Yeah, he did come up with opinions based upon food shortages, and they go into uplands --
THE COURT: I agree with you.
MR. FERNANDES: -- and they die.

BY MR. FERNANDES:

Q. And my only point is in 2009-2010, when the average use of the uplands was 47, as compared to 17 --

A. But --

Q. -- wasn't there only one reported mortality?

A. My, my point here is the numbers here are the number of birds that Tom Stehn saw on the uplands while conducting the survey. If I was going to evaluate burn use, like I did at some point in my dissertation, I would spend a lot more time out there determining the use of uplands. So this is the -- are there more birds observed by Tom during that year? Yes. That's true.

Q. So if I'm hearing what you said in your answer, if you wanted to know whether or not use of the uplands was greater or less in '08-'09 and '09-'10, you would have to spend a lot of time studying it?

A. Well, my point is you said "use of uplands." Well, the numbers don't reflect the use of uplands. They reflect the number of cranes Tom observed in uplands. That's my only point there.

Q. Okay.

MR. FERNANDES: Pass the witness, Your Honor.

MR. MUNDY: Just to pick up, can we have that -- well, we don't need it.

REDIRECT EXAMINATION

BY MR. MUNDY:

Q. Just to follow up on that last point, how long do the cranes typically stay at a pond? Number of minutes, hours in a day, how long do they typically, if they come up to the pond to drink water, how long do they typically stay there?

A. Five to ten minutes.

Q. Okay. And when the plane is flying, from your personal experience flying the planes up, down, up, down, you just take the birds wherever you find them at any given particular moment, snapshot in time. Correct?

A. That's correct.

Q. Statistically -- well, I don't know if it's statistics, but just likelihood of encountering the bird, if it's at a pond for five minutes versus in the salt marsh for hours, obviously just more likelihood you're going to encounter it out in the marsh, where it's for hours at a time versus the five minutes at the pond?

A. That's correct.

Q. Okay. And that's what you're trying to explain, that's where he found them versus the amount of time they spent using it?

A. Right. Well, for example, this past week I saw 24 cranes come to a pond before 9:00 a.m. Well, if you -- if Tom flew after 9:00 a.m., we would never know that those 24 birds had gone to drink water.

Q. Okay. The fact that you start seeing some at ponds, where you might not see them, that sometimes may be indicative of time spent, more likelihood of encountering them there, but doesn't necessarily indicate the opposite of that, does it?
A. That's correct.
Q. Okay.
MR. MUNDY: May I have the ELMO, please?
BY MR. MUNDY:
Q. Mr. Fernandes had raised an issue saying that only 25 percent of the birds live in the Aransas National Wildlife Refuge, within the proper property boundaries of the refuge. That's -- this is Plaintiff Exhibit 45 we've seen before. But the refuge, you were responding to in that question, there's -- it's clearly, you know, private property owned by the federal government. Correct?
A. Yes.
Q. Matagorda Island is recognized as a distinct property from the Aransas National Wildlife Refuge. Correct?
A. Correct.
Q. The Matagorda Island national wildlife is also -- excuse me, let me rephrase that. Matagorda Island is also established as a federal national wildlife refuge for the benefit of the cranes also?
A. Correct.
Q. So when you answered the question about, or as

Mr. Fernandes asked it about only 25 percent live within the boundaries of the Aransas Refuge, that does not include the birds that live over on the Matagorda Island national refuge. Correct?

A. Right.

Q. Besides that, there are other areas that are protected through conservation easements and cooperative efforts of nonprofit groups interested in the cranes' protection, Houston Audubon, Travis Audubon, the International Crane Foundation, Nature Conservancy, and even private individuals. True?

A. Correct.

Q. And you have receptive private property owners who care deeply about the cranes and work cooperatively with men such as yourself, the refuge staff, to protect and care for the cranes?

A. That's correct.

Q. The Defendant Exhibit 124 -- let me find it. Okay. Well, since much has been discussed about this in bits and pieces, explain -- take just a moment to go through carefully, when -- what was the purpose of preparing this one, two, three, four, five-page report?

A. Well, it was a way to transfer the information I had gathered or observed to the refuge.

Q. Okay. This was when you were asked to come down in February of '09, and then this is just a brief synopsis you wrote up and sent back?

A. That's right.
Q. How were you employed -- by whom were you employed at the time you visited and you generated this report?
A. The Crane Trust.
Q. Okay. And when did you write this brief report up, approximately?
A. I believe it was April, May --
Q. A month or two after the visit?
A. April, May of 2000 -- yes.
Q. Okay. And while it's obvious, I want to make it very explicit on the record because of the serious nature of the allegations, were you retained by an expert by the Plaintiff organizations at the time you either visited the refuge in February '09 or prepared this report in April or May of '09?
A. No.
Q. Did you anticipate sitting here in a courtroom today giving testimony at the time you did the visit or prepared the report?
A. Never crossed my mind.
Q. Okay. When did you leave the employment of The Crane Trust?
A. December 2010.
Q. December 2010?
A. Correct.
Q. So a year and a half later after this report?

A. That's right.
Q. Okay. When you left The Crane Trust, I think you started to explain to Mr. Fernandes, these were not videotapes that -- or you said y'all gathered evidence and videotaped the activities back when you did your visit?
A. Correct.
Q. Or your assistant did?
A. Yeah. And I guess it's a misnomer. They're not videotapes. They're digital recordings. So there are no tapes. There's digital files in the hard drive.
Q. In fact, that was my next question, and then they're stored on The Crane Trust just business office computer?
A. We had them in our, in a laptop that we used in the field, and then it's standard policy to transfer all field information to, to the server at some point in time.
Q. Okay. And as I think all of us that have worked in various jobs, when you leave the employment, that computer remained behind as the property of your former employer?
A. That's correct.
Q. You did not take it with you?
A. No.
Q. You in no way had -- well, do you know in fact one way or another if those computer files with the video observations discussed in this five-page report, do you know one way or another if they still exist as of today?

A. I do not.
Q. But to make it abundantly clear to Judge Jack, did you or anybody on the Plaintiffs ever request or suggest or try to have those files deleted in any manner whatsoever?
A. No.
Q. You had started to explain, I think, to Mr. Fernandes, you made a request where those were located, and we saw the letter from Mr. Irvine --
A. Well, yeah.
Q. -- to comply with the discovery in the case.
A. I talked to staff at the trust trying to explain where I thought they were, and I also got -- at the time the recordings occurred, the technician that was working with me, she had obviously dealt with that computer and those files a lot more than I did. So we contacted her. She was no longer at the trust either. But she talked to staff at the trust as well and tried to explain where, as best she knew, where they were, so --
Q. You made your best efforts to help aid discovery of the parties, both sides obviously trying to attempt to gather those?
A. That's correct.
Q. But they were not within your control and not within the control of any of the lawyers for either side?
A. That's right.

Q. Okay. Give me just a moment.

If you would, explain very -- let's go through this very quickly. Explain what your general observations were of the March conditions. Let's see if I can zoom this in. Explain to the Judge, we had a pretty good education about what you do in general, but explain what you found in the March '09 observation.

A. Well, the very low tides that were visible when I visited is probably the striking feature that I saw when I was there.

Q. Now, you discuss in here mud cracks as deep as four to five inches. Mr. Fernandes had raised a question or made the suggestion that a strong cold front had come through while you were there, the norther, if you will, and that pushed all the water out. Were the observations that you actually saw in February, are those consistent with a one or two-day tidal push from a norther, based on what you've seen in your years out there doing your field work as a Ph.D. candidate?

A. Yes, my experience is a strong norther will decrease the level of the marsh significantly on Aransas while actually increasing the levels on Matagorda, for example.

Q. Okay. But would that indicate the conditions, the severity of the dead wolfberry plants, for example, as you described, would that be due to a one or two-day tidal shift from a norther?

A. Wolfberries dying within a two or three-day change? I

doubt it.
Q. Yeah. I thought -- did you, I thought you told Mr. Fernandes you saw dead wolfberry plants.
A. That's correct, yeah, a lot of them.
Q. They wouldn't have died from a norther pushing water off for a day or two?
A. Oh, no, because that's very common. Every winter it happens.
Q. Okay. And by the same token, explain if the water -- where did my map go? If the norther is blowing in this way -- I'm not sure that even helps. If the northers blowing wind -- or point out, which way does the wind come if there is a norther pushing water?
A. It would be from the top left corner.
Q. And where would that water stack up?
A. On the barrier islands.
Q. Okay. But the map of the mortality for that winter, there was mortality on both sides, the Aransas side as well as the Matagorda side. Correct?
A. Correct.
Q. Do you think there's, that a norther explains the mortalities of that winter, '08-'09, in your belief --
A. A norther --
Q. -- reasonable, professional opinion, based on your experience?

A. No.
Q. You note -- this is a, this report done in '09, the wolfberries had died out. And this is an area where there had been abundant wolfberries previously, and you had previously collected the feces collection sites. And what was the reason for visiting those sites?
A. Because these were areas that I knew had abundant wolfberry plants from my previous visits.
Q. Explain the statement here starting off, "While" -- if you would just go ahead and read it and explain it.
A. "While this may be due to natural weather conditions or other natural phenomena, the result is that less wolfberry plant abundance would equal less wolfberry fruit," food in parenthesis, "for whooping cranes and likely would exacerbate food stress during a year when blue crabs appear to be in low abundance and of difficult availability."
Q. And again, when you're writing this, you had no idea you were going to be involved as a witness in this case presenting this testimony to the Court, did you?
A. That's correct.
Q. And you, at that time your contemporaneous perception was whooping crane observations indicative of food stress, these are your own personal observations?
A. Correct.
Q. And it's what we've already been over and explained this

morning to Judge Jack?
A. Yes.
Q. And the game, just to make it clear, but the game camera photos have an instantaneous date/time stamp on them when the camera is automatically triggering, taking the photos?
A. That's correct.
Q. All right. Mr. Fernandes was offering his elaborate theory of this table, Plaintiff's Exhibit 31, showing the peak counts, the mortality, the return mortality, so forth. And you were up there trying to kind of get a word in edgewise with it. This is your chance. If you would, please explain what -- I guess two things, your reaction to Mr. Fernandes' theory he presented to the Court about the, quote, missing birds reappearing, if you will, and whether or not you believe that's the most likely explanation --
A. Right.
Q. -- of these numbers.
A. Well, I guess the difference between what I believe -- I mean, I think there's explanation, a potential explanation that doesn't require birds to reappear. Mortalities for that April to November period was low, obviously, as predicted there. But when we look at the numbers of birds that left, 247, and the number of chicks that returned -- I'm going to have to make some notes.
So we have 247, 22 chicks, or minus the 5 mortalities. We

had 22 chicks --

THE COURT: 264.

THE WITNESS: Okay. Are you saying the 22 plus 245?

THE COURT: Well, they counted 264 that came back. Right?

THE WITNESS: Right. 22 of those were chicks. So if we had an additional 17 birds that were presumed dead and appeared, we should have had 267 plus 17, as the count, for that, that preceding -- or the next winter. And it's not at that point at all. It's much lower than what you would expect had 17 birds, additional birds showed up the following winter.

BY MR. MUNDY:

Q. To make sure I understand, you're saying if Mr. Fernandes' theory is right, that the 17 birds were just missed, returned up to the breeding grounds, and then returned the following year, you know, reappeared, the Phoenix effect, if you will, you would have had to also add the 22 known chicks that were born that summer on top of the 17 that reappeared.

A. Right. So you should have had at least 281 to 284 birds --

Q. Okay.

A. -- or population the following winter.

Q. And that is obviously not what is reflected by observation?

A. And that was not what was counted that following winter.

Q. Okay. Bottom line, that theory of the Phoenix effect, in your professional opinion, what's the likelihood of that being the accurate explanation?
A. Well, I mean, earlier when I speculated about that theory, I have no doubt of Tom's mortality counts, so --
Q. Okay. Fair to say it's a high, in your professional opinion, a highly unlikely explanation of the events?
A. That's right.
Q. Next, there was some discussion about stress hormone analysis from the fecal samples done, and you discussed, or mentioned -- and I want to come back and let you expound on it just a little bit, to explain to Judge Jack what you were trying to tell Mr. Fernandes -- but explain what, when you do a fecal analysis for stress hormone, what it is and what you were meaning by baseline, species baseline, or "species specific baseline," I believe, was your exact term.
A. Right. When an animal gets stressed, there's certain chemistry, chemical issues that happen. Food stress, disturbance, a lot of different stresses cause corticosterone to show up in the blood and eventually the --
THE COURT: So the fight or flight?
THE WITNESS: I'm sorry?
THE COURT: The fight or flight --
THE WITNESS: Yes.
THE COURT: -- mechanism.

THE WITNESS: Or, so they appear in the feces. So you would expect if you visited an area with very little disturbance, good food availability, that those birds should be less stressed than birds in an area with a lot of disturbance and a little bit of food. And actually, that was what one of my graduate students was studying precisely that, a relative difference in stress hormones among areas with a lot of food, little disturbance, versus areas with little food, high disturbance.

BY MR. MUNDY:

Q. Okay.

A. So, but in that case, what the numbers will tell us is this is higher than this, or vice versa. We don't know what the net numbers mean, because until you establish a baseline, what is the normal stress hormone levels of a bird not under stress in the wild under natural conditions. For whooping cranes and even sandhill cranes, we still don't know what that baseline is. So that's why I cannot interpret what the numbers mean of the whooping cranes. Is it normal? I don't know. Is it abnormal? I don't know. I cannot address that.

Q. Is it accurate to say -- well, I guess you said you don't have adequate data, even at this point, on the sandhill cranes?

A. That's right. The comparisons we're doing with sandhill cranes is relative. Is it -- you would expect higher stress hormone levels in areas with high disturbance and low food. So

that's what we're looking for there. But we don't know --
Q. But those hormone --
A. -- what the numbers mean.
Q. Bottom line is hormone, stress hormone levels vary by species, whether it's --
A. Yes.
Q. -- different species of birds, mammals, whatever?
A. That's right.
Q. It's not accurate to compare one species' hormone level versus another species' hormone levels?
A. That's correct.
Q. So you're looking to establish a baseline data set specific to, in this case, whooping cranes, and then you can use it in the future years for comparative purposes?
A. Right. We're hoping that some of that may be done with the captive breeding facilities, which birds we believe are not stressed, have enough food, and things like that.
Q. Okay. The, I think kind of going back close to the beginning of Mr. Fernandes' examination, he showed you a narrative description that resulted in, I think it was the second necropsy report of an adult demonstrating aggression towards a juvenile, and then implication being the adult killed the juvenile, and the carcass was recovered a day or two later. You remember that?
A. Yes.

Q. What, in your experience, is the significance of an adult demonstrating aggressive defensive behavior towards a juvenile indicative of?
A. Well, if I remember what I was talking with Dr., with Mr. Fernandes, it was, it seems to be a territorial family defending their territory against another territorial, or another family. It just happened the chick was the one that got the worst of that particular event, if I remember correctly.
Q. Bottom line, from what we've talked about this morning, primary reason for that behavioral pattern, the territoriality, is food, defense of food source?
A. Correct.
Q. Going to Defendant Exhibit 21, which he discussed a little bit about. This is from 2003, where you attempted -- well, just read the title, if you will.
A. Patterns of Relationship Among Whooping Crane Fitness, Blue Crab Abundance and Fresh Water Inflows and Exploratory Assessment of Available Data Sets.
Q. And I think you -- you tried to explain to Mr. Fernandes, let me give you a little more opportunity, what do you mean by saying it's an exploratory assessment?
A. Well, at the time I wasn't even sure that there was a, I could find any connections or correlations between variables. And one of the issues, when you're looking at data sets that

are collected for purposes unrelated to your research, you don't know if that information is specifically relevant to what you're trying to investigate.

So to me, this was a way to, okay, are those datas in any way meaningful or not meaningful? I mean, I had no idea. I --

Q. Just opening the dialogue, if you will?

A. Well, my idea was to see, if there was something interesting in this exploratory analysis, then we would try to focus research to address some of those issues. That was the point of this presentation.

Q. You put in a cautionary note. Please read this and explain it if you will, the first sentence of your cautionary note, or the first few --

A. "This exploratory analysis is not intended to imply that any relationships found here are cause and effect; however, it is intended to help elucidate where currently monitored variables may be useful for long-term monitoring and which could be modified."

And obviously my caution here, for example, is the blue crab data that I utilized, for example, are measurements taken in the bays. Now, obviously blue crabs in the bay are not available for whooping cranes to eat. But there's a certain connection that, yes, blue crabs will eventually move into the salt marshes, et cetera. So --

THE COURT: I'm sorry. what's not available? I

missed that.

THE WITNESS: Well, like if we measured blue crabs in the deep bay --

THE COURT: Oh, okay.

THE WITNESS: -- that doesn't mean --

THE COURT: Right, out in the ocean.

THE WITNESS: -- that the cranes can have access to them.

THE COURT: Yeah.

THE WITNESS: Right.

THE COURT: Okay, thank you.

THE WITNESS: So that's why that caution is. The data sets were collected for reasons completely unrelated to what I was trying to explore.

BY MR. MUNDY:

Q. And just to kind of cut to the bottom line here, it says, "Relationships found and reported here should be used to generate potential hypothesis, and as the focus for further research and evaluation to determine the actual cause and effect mechanism or processes."

A. Right. As I explained, this is -- that was the whole purpose of this. And I think this has been mischaracterized considerably, because this is a presentation that I did. This was never intended to be a publication. It was never submitted for publication. It was just because several people asked me

about my presentation. And without text, the presentation would not be clear. So I wrote this up for those folks who asked me about the presentation. It was never intended to be a publication to go anywhere.

Q. Let me cut just to the -- let's go to the very tail end, I think, kind of summarizes it and have you explain it. If you would, explain this last paragraph, "The obvious limitations." If you would, read that and explain it.

A. "The obvious limitations in the analysis presented is that while we have evaluated patterns among independent data sets, we do not know or attempt to explain the process by which the observed relationships may be explained. Therefore, the information presented here should be considered, as stated on the objectives, as a first exploratory analysis of relationships among the different variables for which there is data available.

"What this analysis does do is show some strong and significant relationships among several variables for which further work could be more specifically planned and directed. The exact process to explain the patterns or relationships presented here can only be assessed through empirical data collection via field research."

Q. Okay. And that further, that further research is the type done by Dr. Sass and Dr. Ensor and presented to Judge Jack?

A. Right.

Q. That's what you envisioned?
A. Well, I envisioned much more as well, but --
Q. That's a starting point?
A. Yes, correct.
Q. Okay. The testimony you've given Her Honor about the food utilizations and the overviews in general, you've published this in numerous studies, but one, just to give an example, if you would, is from 2005, the Patterns of Food Use in Wintering Whooping Cranes on the Texas Coast. And this was put out in a professional, let's see, the Proceedings of the North American Crane Workshop, Number 9.
A. Correct.
Q. This is subject to -- well, knowing how small that group of peers is, probably some pretty serious --
A. That's right.
Q. -- scrutiny of having to look them in the eye. But this is a peer review group --
A. Yes.
Q. -- and proceeding.
A. Correct.
Q. Professional organization.
A. Correct.
Q. And your -- the testimony you've given to Her Honor is the same as what you've done and published previously to your colleagues and professional contacts?

A. To the best of my ability, yes.
Q. The methods, the analyses, the conclusions, what you've presented to Her Honor is the same as you've presented to your colleagues out of court, you know, in the years past, long before this case ever came around?
A. Correct.
Q. Looking at Table 1, just in brief -- I may have to zoom up a little more -- I wanted to have you explain the difference, and then we're going to have you explain the pie chart Mr. Fernandes was showing. But explain what you did of your analysis, what this means, volume frequency, and then broken out by month.
A. Well, frequency is simply the percentage of feces samples that have a certain food item. In that case of the first one, blue crab was in 20 percent of feces collected in November, for example. The volume is basically the amount of that food item that is present in feces samples.
Q. And this is a methodology that is the same essentially, or substantially similar to what we have from 1952 Allen, at Page 112, Table N, where he describes in his terminology being number of times food, times found in samples, percentage occurrence in samples, and then separately analyzes it by volume. Correct?
A. Correct.
Q. Okay. Now, explain, since I have this one sitting right

here, can you explain the difference between percentage occurrence in samples versus percentage of total volume, and then compare that to the pie charts?

MR. MUNDY: Might I approach and take the pie charts off the witness bench, Your Honor?

THE COURT: Yes, sir.

BY MR. MUNDY:

Q. Explain to Judge Jack, if you will, these numbers -- let's stick with blue crab by percentage occurrence in the samples versus percent of volume in samples, and then explain which one Mr. Fernandes utilized to make his pie chart.

A. Well, again, the number -- what Allen calls percent of occurrences in the samples is basically the same thing as frequency in the previous table. The volume, again, is the proportion of -- the percentage of the feces sample that is composed by a particular food item. So in this case, the average percentage of volume per sample is 58, I believe, blue crab.

Q. Okay. So this, let's walk across Line 1 here, blue crab. Number of times found in samples, that means they have 30 --

A. 30 feces samples with blue crab.

Q. And that's of all the samples collected, that means 85 percent of all the fecal samples collected have blue crab.

A. Correct.

Q. Correct?

A. Yes.
Q. Okay. But then analyzing by volume each of the fecal sample is just saying the volume as measurement is 42. But does that --
A. 42 is of all the samples, if you added them all up --
Q. By volume?
A. By volume.
Q. Okay. Does that mean that only 42 percent of what cranes eat is a blue crab?
A. No.
Q. Okay. Now, when Mr. Fernandes made his pie charts and showed them earlier in cross-examination -- I'm sticking with this one -- he had winter whooping crane diet described in Allen. He has 42 percent for blue crab. If we go back -- what's that 42 percent on Mr. Fernandes' chart showing?
A. Mr. Fernandes used the Hunt and Slack --
Q. Well, I'm using, I'm looking at his chart for --
A. Oh.
Q. -- the one he did on Allen.
A. I see.
Q. I'm trying to stick with the exact chart, Allen --
A. Oh, okay. Sorry.
MR. FERNANDES: We never offered -- well, we never offered that, Counsel.
BY MR. MUNDY:

Q. Well, we can go to the Hunt and Slack. You analyzed the Hunt and Slack graph.
A. Right, that's the one I had seen. Right.
Q. Okay. And was this --
THE COURT: And that's number what, Exhibit Number what?
MR. MUNDY: I don't have the Defendant exhibit that he used on this. He did offer it in evidence. I don't remember the exhibit number. It's not marked on the copy I --
THE COURT: Number 380, 81 through 83? Is that right? Mr. Fernandes?
MR. FERNANDES: What was it?
THE COURT: 380, 81 and 83?
MR. TAYLOR: Yes, Your Honor. This one actually is 378A. This is the first one entered.
THE COURT: Got it. Thank you.
BY MR. MUNDY:
Q. But just to make very clear so there's no confusion, should the Judge walk away believing that these charts, when it says "volume," that means that 42 percent of what they eat is a crab versus how important the crab is, number of times they eat it or the number of birds that eat it, explain the difference in those two columns.
A. Well, this one is, is based on the volume of the food item present in all feces for all winters, is the way, if I'm

reading the table correctly, 40.1 is basically --
Q. Let's see, I have the actual, I have Mr. -- I have the actual publication with the actual table, too.
A. So the volume of blue crab found in all feces for that winter was 40.1 percent. That's --
Q. Okay. This is Hunt and Slack, Winter Diets of Whooping Cranes, Sandhill Cranes in South Texas. So first off, this is not exclusive to whooping cranes, is not the sole focus of this paper, is it?
A. That's right.
Q. Now, this table -- I should ask, Dr. Slack was your, the person that, under whom you studied for your Ph.D. dissertation?
A. That's correct.
Q. And what caused you to pick the subject matter of your study for your Ph.D. dissertation and field work?
A. Well, because it was an endangered species, and I was -- I always wanted to have my career in conservation and endangered species, is one thing I wanted to work with.
Q. Okay.
A. And Dr. Slack had offered me the position to do this project, so I immediately jumped on the possibility.
Q. Okay. And what was your understanding of the work you were performing as it related to this earlier study from the 19, early or mid 1980s, done by Hunt and Slack. What was --

where does yours fit in relationship to this work?
A. My understanding in general was, obviously I hadn't read a lot of the literature at the time, but was that a lot of this work was performed at the edge of the salt marsh, and a lot of focus on the uplands. One of the issues they were looking at with Hunt's data was some cattle grazing issues and other things which occur in the uplands. So my focus was going to be kind of strictly focused within the salt marsh areas primarily. That was my --
Q. And Dr. Slack encouraged you to take their starting point, add to it, add further information, further observation, further data, and draw the newest, bestest conclusions, if you will?
A. Right, and to review all the previous literature, and this was one of those available.
Q. All right. And then looking at the figures that we see on -- I think I've lost it again -- those pie charts for blue crab, the 40.1 is indicating what?
A. The volume of blue crab found in all feces.
Q. Okay. And what was the frequency it was found, in what percent of samples?
A. 61 percent.
Q. Okay. And when you start trying to analyze the volume of the fecal content, you start encountering issues about digestibility, and they may eat a whole lot of something, but

is it highly digestible, or a wolfberry may have a seed which doesn't digest, is a comparative example?
A. That's right. That's right.
Q. Okay. Just kind of, you have experience in making real time wildlife management decisions for endangered species is what you've essentially devoted your career to?
A. Yes.
Q. Mr. Fernandes had asked about, well, couldn't you do this study, and you would -- if you were doing things, wanted to have the ideal study in February of '09, you could have designed a longer term study. But when you're making real time decisions of wildlife management affecting an endangered species on the spot with what contemporaneously is perceived to be an emergency crisis, do you have the luxury of doing long-term studies, or just kind of take experts such as yourself and other members of the Recovery Team and rely on their expertise to form best judgments?
A. Well, when you're dealing with endangered species and under critical situations, sometimes you don't have the luxury of long-term field studies to make a decision. So decisions have to be made sometimes with quite a bit of uncertainty and lack of knowledge and use the best information that we have to that point in time, whether it's a long-term study or some observations from experts or whatever you have at hand.
Q. Fair to say that's one of the, one of, not certainly the

only role, but one of the important roles of having that International Recovery Team in place so that you have already the experts communicating with each other and able to, you know, to call on each other and lend help, lend expertise, lend guidance, lend judgment?

A. That's correct.

Q. And in fact, that's what you were called upon in February of '09 to do?

A. Correct.

Q. And did give your best efforts to help protect the cranes at that time?

A. Correct.

Q. And everything you did then, in hindsight, you still believe to be accurate, and as you've told the judge to be your best judgment, based on your own personal experience, professional training, everything you know up to this time?

THE COURT: Is this it?

THE WITNESS: That's correct.

THE COURT: Are you done?

MR. MUNDY: Yes, Your Honor.

THE COURT: Okay. Anything further?

MR. MUNDY: No, Your Honor. Thank you.

MR. FERNANDES: Just one question.

MR. MUNDY: Oh, I'm sorry.

THE COURT: Go ahead. Mr. Fernandes has one

question.

RECROSS-EXAMINATION

BY MR. FERNANDES:

Q. When you wanted to know how much --

THE COURT: At the microphone.

BY MR. FERNANDES:

Q. When you wanted to know how much energy the cranes were getting for the purposes of doing your energetics model, didn't you use volume?

A. I used -- not of feces. I used the number of food items consumed and used their weight, their masses, to determine.

Q. In your dissertation, you didn't use volume?

A. Not of feces that we're talking about.

MR. FERNANDES: Okay. Pass the witness.

MR. MUNDY: Nothing further. May he be excused?

THE COURT: Oh, I would think so. Thank you.

THE WITNESS: I hope so.

MR. MUNDY: Thank you, Dr. Chavez, very much.

THE COURT: Next witness?

MR. BLACKBURN: I call Tom Stehn.

THE COURT: Mr. Stehn, the eagerly awaited witness. Would you come up here and we'll administer the oath, please, sir.

MR. BLACKBURN: You need to go right to that place right over there.

THE COURT: Sorry, too many directions.

(Witness sworn.)

THE COURT: We're going to 6:00 tonight. That's all. We'll be going till 6:00 o'clock tonight, and that's all. Go ahead.

TOM STEHN, PLAINTIFF'S WITNESS NO. 5, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Good afternoon, Mr. Stehn. There have been several of us that have been wanting to talk to you for some time. Welcome. I'm Jim Blackburn. I represent The Aransas Project. And we've met before, have we not?

A. Yes, sir, we have.

Q. And we haven't talked or worked together or anything like that in preparation for your being here, have we?

A. Not at all.

Q. What I'd like to start off with is just asking you to kind of describe your educational background and how you came to work at Aransas Wildlife Refuge.

A. I have a bachelor's degree from Carlton College in Minnesota, went on to graduate work, got a master's at University of Montana, and started a professional career with some work in Iowa, a couple of different jobs, went into the Peace Corps, did two years of wildlife work in Africa setting up a national park.

THE COURT: Where in Africa?

THE WITNESS: In Swaziland, South Africa. And came back and got on with the U.S. Fish and Wildlife Service as a Outdoor Recreation Planner at the Anahuac National Wildlife Refuge, and after two years at Anahuac, two-and-a-half years, transferred down to Aransas in the fall of 1982, and I've been there through September 30th, 2011.

BY MR. BLACKBURN:

Q. Now, at Aransas, I believe you came to work with whooping cranes. Did you start off that way?

A. I had -- no, my master's was in big game management and radio tracking elk.

THE COURT: In what management?

THE WITNESS: Excuse me?

THE COURT: In what? Master's of what?

THE WITNESS: In wildlife science, and the thesis was on radio telemetry of elk.

BY MR. BLACKBURN:

Q. And where was that from?

A. University of Montana.

Q. And so --

THE COURT: Wait a minute. I'm sorry. What year did you come to Aransas?

THE WITNESS: 1982.

THE COURT: Thank you.

BY MR. BLACKBURN:
Q. And what was your first job at Aransas?
A. I was the refuge biologist.
Q. And what was that? What did that work entail?
A. That entailed basically running the program, anything to do with any kind of wildlife. So I did everything from deer to Christmas bird counts to whooping crane census.
Q. And then did you move up in the, I guess the administration or in the ranking of Fish and Wildlife?
A. Yes. After 15 years, the first Whooping Crane Coordinator who was stationed in Albuquerque, New Mexico, which was our regional office, he retired. And because of the expertise I had developed with whooping cranes, they offered me the position of Whooping Crane Coordinator.
Q. And when was that?
A. I believe 1997.
Q. So you served as Whooping Crane Coordinator from 1997 until your retirement?
A. That's correct.
Q. And I take it you are recently retired?
A. Yes, two months ago, until Monday afternoon.
THE COURT: Congratulations.
BY MR. BLACKBURN:
Q. Now --
THE COURT: Should we ask him what his expert fees

are, so I can award those?

MR. BLACKBURN: Sure.

THE COURT: I'm just going to do them 50/50.

BY MR. BLACKBURN:

Q. How much would you like to charge per hour for being an expert here? I would suggest to you that many of the --

THE COURT: What's the usual rate?

MR. BLACKBURN: $200 an hour.

MR. FERNANDES: That's fine, Your Honor.

THE COURT: Okay. And he's been here since 8:30?

MR. BLACKBURN: You were here yesterday. Right?

THE WITNESS: 3:30 yesterday afternoon.

THE COURT: Is that right?

MR. BLACKBURN: So --

THE WITNESS: Thank you.

THE COURT: That's not to prematurely say I'm going to use him as, qualify him as an expert, but if that happens.

MS. SNAPKA: Your Honor, what we had discussed with the U.S. Attorney who's representing him, and I'm sure --

THE COURT: He's not really any more.

MS. SNAPKA: Well, okay. What we are willing to do, and I'm sure Mr. Blackburn is willing to do, is regardless of whether or not he is qualified, we certainly believe that he needs to be compensated for his time and will agree to do so whether or not this Court finds him an expert.

THE COURT: Thank you.

MS. SNAPKA: And whether or not the Court orders it, we will do it voluntarily.

MR. BLACKBURN: And we agree.

THE COURT: $200 an hour then.

MS. SNAPKA: Yes, Your Honor.

THE COURT: And that's good Christmas money, huh?

BY MR. BLACKBURN:

Q. Now, first during your time as a Refuge Biologist, I think your testimony is you came to learn about whooping cranes. Would that be fair?

A. Well, my first week on the job, the first thing a new employee traditionally does is starts reading the refuge annual narrative report, which outlines everything that happens during a particular year on the refuge. And I read two or three of those refuge reports, and right away it was obvious that to me everything focused around whooping cranes.

So it was in the fall, the newspapers were calling, wanting to know how many whooping cranes there were. I started the census flights, and my interest just zoomed and focused on whooping cranes. And it was very apparent to me that Aransas National Wildlife Refuge is all about whooping cranes.

Q. And when did you start conducting census flights?

A. It was that very first fall, I think fall of 1982.

Q. Now, had census flights been conducted prior to your

starting in 1982?
A. Yeah. The census flights date back to 1950, and practically done on a weekly basis. There were some interruptions by various reasons, but generally weekly or every couple of weeks.
Q. And when you started in 1982 on these census flights, were you in charge of the census flights?
A. Yes, I was.
Q. So from the beginning, it was sort of your responsibility to work on these census flights?
A. Yes, sir. Fortunately, the pilot had done -- his name was Robert Tanner, and he had done the census flights with the previous biologist named Steve Labuda (phonetic). So the pilot knew the ropes, at least of the way they had been done in the past. So obviously, my first few flights, I just observed, as he said, "Well, this is the way we do it."
Q. And as you moved from year to year, did you begin to change or develop your own approaches to the flights that were being undertaken?
A. Somewhat. It kind of evolved -- well, it evolved as there were changes in the whooping crane program. For example, the banding program provided us the opportunity to all of a sudden read color bands from the air on these census flights and get data on individual cranes. So when that banding started, which was actually right away, it started in 1981, one of the things

we did was start reading color bands.

Another change that has occurred has been the development of the GPS technology. So now the last few years of flights I've done, several years, has used that GPS technology to create a much more exact search grid and make sure that every area of the marsh is covered.

Q. And so when you first started, the color banding program was underway, and would you describe -- we've had some testimony about it. I know it's been a long day for everybody, but I think we're all happy to have you here. And just describe briefly your experience in surveys for color banded birds. Are they different than what, for example, you did during the last five or ten years?

THE COURT: Wait a minute. The aluminum banding started in '80, '81?

THE WITNESS: And the color banding at the same time.

THE COURT: Both, okay.

THE WITNESS: Right. It was -- I think it was, it was 1981 through 1988 when the color bands and the aluminum bands were put on cranes.

Yeah, and that -- basically, as I'm doing my survey, ideally I'd see cranes, and I'd immediately tell the pilot, "Do a low and slow pass past the cranes." And we would drop down from our 200 feet, where we normally did our survey, and he would get down to anywhere from 20 to 50 feet above the marsh

and basically fly just to the side of the cranes. And he's got full flaps on, going as slow as he can safely, and I'm recording the color bands that I see.

THE COURT: What kind of binoculars do you use with that?

THE WITNESS: None. Bare eye.

THE COURT: Okay. How close are you?

THE WITNESS: Maybe myself to the screen there.

THE COURT: Are you serious?

THE WITNESS: Yeah. We get, we get right on top of them.

THE COURT: What's that, about 15 yards? Less?

MR. BLACKBURN: 15 yards? Yeah.

THE WITNESS: Yeah. And we'll be, you know, 10 yards above their heads maybe and 15 yards to the side. Right. And it's fun. When, as Dr. Chavez talked about, there were as many as four color bands, four colors per crane. And if I'm looking, if I'm zooming past a group of six cranes, I've got, what's that, 24 colors to record, in about, what, a second-and-a-half as we go past. So it was fun. And in a case of a group like that, you'd make maybe two or three passes to get all the bands read.

Now, one thing that changed, as time went on, and this was brought up this morning, there was a comment on, I believe, on not, that we're not doing so many low passes any

more, in my final years. And part of that was not so many banded birds. Part of it was the bands had faded, so it's extremely difficult to see some of those bands. Some of the bands had fallen off. Some had lost all the color, so they're just black. And seeing a black band on a black leg is rather difficult.

But the primary reason in the last few years is we switched aircraft. And instead of flying, I started my surveys in a 152 Cessna, and we ended up currently this last year in a Cessna 210. So that your speed, your minimum speed is so much greater in that 210 that it was really not safe to slow down the plane enough to be able to read color bands.

The other big difference was whenever you go out on a census flight, you have objectives. And there are, there's a time crunch, all kinds of federal regulations on how many hours you're allowed in the air. As the crane range got bigger and bigger and bigger, that gave us less and less time to do circles and do low passes and cover extra areas. And you had to make decisions on what you were going to focus on.

BY MR. BLACKBURN:

Q. Do you recall the last year when you made a large number of low passes? I know none of us have practiced any of this with you, so --

A. I would say three or four years ago. And I realized in the Cessna 210, with the new pilot named Gary Ritchey, that

your success rate on reading those faded color bands was, was getting fairly low. And so it really was not worth the extra time and the extra expense of doing those low passes.

THE COURT: So you were doing high passes?

THE WITNESS: Well, you just stay, you'd remain at the 200 feet.

THE COURT: And that's a high pass?

THE WITNESS: That's a high pass, yes. You, you spend the entire day at 200 feet, Your Honor. And when we get up to 5 or 600 feet, I get scared, because I'm afraid of heights.

BY MR. BLACKBURN:

Q. In addition to, to these flights, which I'll ask you some more details about in a minute, did you have other responsibilities with regard to whooping cranes rather than simply counting them? When I say "simply," I don't imply that that's an easy task, but --

A. Right. I started research projects. So with the color banding, again, I would try really hard -- this is starting in 1982, fall of '82. I would try to spend one day in the airplane, and then one day out in a boat all day long looking at the associations of banded cranes, to see which crane, where they were, who each banded crane spent time with, and to see how that led to possible pairing up. Later on, were they choosing their mates at an early age, or were they waiting

until they were three or four years of age to choose a mate. And when they did establish their territory, where was that territory in relation to where they were as a juvenile. And the banding told us all that information.

Q. And so during this time period when you first came to the refuge and, say, when this banding period was actively in process, is it fair to say you spent a lot of time observing these cranes?

A. Yes. Yes. And I also got involved with the radio telemetry project, and I spent a month in the spring of, I believe, '84 and spring of '85 on the road actually tracking a whooping crane all the way to Canada. And I remember each trip was exactly 30 days, because I remember being gone from my wife exactly, the exact length of time.

Q. And then you migrated back?

A. I migrated back, yeah, very quickly.

THE COURT: So the flight for the birds was 30 days? No.

THE WITNESS: No. The -- the -- yes, the birds were en route for 30 plus days. The actual flight days during that time was somewhere like eight days or something.

THE COURT: Okay.

THE WITNESS: They would make these jumps, and then they would get to a location, and they would spend two, three, four days there with bad weather.

THE COURT: So you tracked a month in '84, a month in '85, and the spring, the migration of a certain whooping crane from here to Canada?

THE WITNESS: Correct.

THE COURT: Okay.

THE WITNESS: And I was, I was on the ground crew. There was a pilot and observer biologist actually tracking the cranes when they were in the air. And then I was in the pickup truck with another fellow, and our job was when the cranes landed, we were to monitor them until they took off again. So that might be the next morning, or it might be five mornings later. And my job was to watch them the entire time and do behavioral studies on them while they were on the ground.

BY MR. BLACKBURN:

Q. And just in hearing you talk about it, was weather a factor in when they decided to take the next leg of the trip?

A. The primary factor was weather, yes, sir.

Q. So they might stay a shorter time if the weather were good, but if the weather was bad, they'd hang around for a while?

A. Yes. They are not -- they are almost never going to fight head winds. I mean, they wait until they have a tail wind.

Q. They're smart. Now, over the years, did you become a member of the International Whooping Crane Recovery Team?

A. Yes. After three years, I think the regional office

recognized my interest in whooping cranes and my involvement with the radio telemetry and the census work at Aransas, and so they appointed me to the Whooping Crane Recovery Team.

Q. And that, so that was after three years, so it would be about 1985?

A. Correct.

Q. And so you have been a member from 1985 until your retirement, or are you still a member?

A. There was a slight hiatus in there when I got kicked off the team, not for bad behavior, but because the U.S. and Canadian teams combined. And so there were, at the time I believe there were, I want to say seven U.S. team members and seven Canadian members on each of the separate teams. And then when they combined, they made a joint team of just ten members. So some of the American members had to drop off and some of the Canadian members had to drop off. And I dropped off for, I want to say one or two years. And then when I became Coordinator in 1997, I was back on the team. And when I, those years I dropped off, I still went to meetings, I just didn't have the, any kind of voting authority.

Q. And why did the teams combine?

A. Just because it's an international species, so it makes sense to, you know, if you're going to, if you're going to recover a species, it's got to be successful recovery in Canada and in the United States, so it made a lot of sense to have the

teams work together.
Q. So it's an international recovery team, but joint effort of Canada and the United States?
A. That's correct. And then the cochairs are the Whooping Crane Coordinator for the U.S. and the Whooping Crane Coordinator for Canada.
Q. And so you went back on in 1997, and did you ever hold a leadership position with the American delegation?
A. Yes. I was the leader of the American delegation.
Q. And did you retain that position until your retirement?
A. Yes, I did. Some claim I'm still on the Recovery Team, since I haven't officially resigned, so --
Q. Has there been a meeting since you've retired?
A. No. No.
Q. Now, over the years that you were working with whooping cranes from 1982 until a few weeks ago, did you have occasion to write papers?
A. Yes. Yes. I have published 16 whooping crane manuscripts.
Q. And then do you also produce annual reports regarding the whooping cranes at Aransas Refuge?
A. Yes. I believe in, I want to say 1985, the previous Whooping Crane Coordinator, Jim Lewis, called me up and he said, "Tom, why don't you write an annual report." And I said, "Okay." And so I've been doing it ever since.

Q. And is that an official publication of Fish and Wildlife Service?
A. It's a, we call it an unpublished file report. Yes, it's a U.S. Fish and Wildlife Service official document.
Q. And --
MR. BLACKBURN: Excuse me a minute, Your Honor.
(Counsel conferring off the record.)
MR. BLACKBURN: May I approach the witness? I want to give him the hard copy of a document.
THE COURT: Sure. Just don't ask questions on the way up and back.
MR. BLACKBURN: I started to.
THE COURT: I know. You and Mr. Fernandes need to be trained.
MR. BLACKBURN: I'm sure that's true, and I -- well, never mind.
BY MR. BLACKBURN:
Q. I'm showing you what has been marked as Plaintiff's Exhibit 22 and has been admitted, and just ask you if this is the type of document that you were referring to as an annual report, or was this a different report?
A. No, this is the annual whooping crane report.
Q. And it's dated, in this case it's Whooping Cranes During the 2008-2009 Winter, dated October 2009. And it's by Tom Stehn. Did you write the entire document?

A. Yes, I did.
Q. And you've basically written one of these every year since when?
A. 1985.
Q. And each of these compiled what happened that year. Is that fair?
A. Everything I learned, I -- I'm kind of a stickler, because I've worked with biologists that know a heck of a lot, and they don't write it down, and they retire or they die, and it's lost. So I figured anything I learn, what's the point of learning it unless I write it down. So it's not peer reviewed. It's not, not even necessarily edited. I mean, I don't, I don't think anybody maybe has, has gone through this and corrected it grammatic -- grammar and all that. In fact, I was reviewing one last night, and I found a couple of grammatical errors.
Q. Oh, I would bet you there are some corrections that may be suggested by, not by me, of course, but -- the --
MR. BLACKBURN: Well, let me just simply offer Tom Stehn as an expert on whooping cranes.
MR. FERNANDES: Your Honor, we object on the basis --
THE COURT: Would you like to have him on voir dire? You're not objecting to his qualifications; it's the designation?
MR. FERNANDES: What we're objecting to is the

reliability. Just so it's real clear, we're not moving to exclude Mr. Stehn's population census counts, the two -- the population census counts and the peak -- the population census counts and the peak population counts that went from, you saw 270, 263, 283. We're not moving to exclude him on those population counts.

What we're moving to exclude him on is his methodology of assuming that a crane is dead if it's missing on a flight.

THE COURT: I haven't heard that from him yet, so I tell you what, I'm going to qualify him, accept him as an expert in whooping cranes, and I'll let you cross-examine him. I think that probably goes more to the weight and credibility, since I haven't heard how he did it.

MR. FERNANDES: Yes, that's fine.

THE COURT: Okay.

MR. BLACKBURN: Okay. Thank you, Your Honor. Now --

THE COURT: Don't say that.

MR. BLACKBURN: I'm sorry.

THE COURT: It always makes me feel like I'm doing somebody a favor when a lawyer says, "Oh, thank you for your ruling."

MR. BLACKBURN: Well, I've suffered a few that were not so nice.

THE COURT: Well, there's more to come.

MR. BLACKBURN: Let me try, let me try to redirect this conversation, if I may.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. Do you recall the year 2008-2009, the winter?

A. Yes.

Q. Now, just out of curiosity, how do you start, what was your practice how to, at the beginning of sort of the fall going, you know, in anticipation of birds, of the whoopers coming down. Do you typically do any type of preparation for that? Is it sort of like school's getting ready to start or something like that? I mean, how -- was there some routine that you would go through before the birds came down?

A. Well, you certainly have to line up your census aircraft for the year, make sure your, you've got all the certifications and training required. And then you start monitoring habitat. I do usually a acorn count in September and start crab counts usually in October and monitoring salinities, as the crane, the time of year when the cranes start approaching, usually in October.

Q. And --

A. And I'm also, sir -- you know, as the cranes are starting to migrate down, I'm a, what's called a key contact for Texas. We have a network of biologists in each of the flyway states, so that when the public calls in and says, "I have a whooping

crane on my back 40," these calls are directed to different people in each state. And I'm one of them, and then it's my job to investigate that sighting and use my expertise to determine if that person actually has a whooping crane on their property or whether they're seeing, you know, six pelicans that flew over.

And then if it actually is a whooping crane, we try to get a biologist out there onsite to determine if the birds are safe or whether there's any management actions that are needed. So that becomes a very busy fall activity for me.

Q. So you're sort of monitoring the flock as it's beginning to work its way down to Aransas and trying to figure out if somebody's gotten lost or if some bird's in trouble. And then I presume they begin to arrive. Is that fair?

A. Yes, sir.

Q. And what do you do as they arrive? Are you out driving around? Do you go out in a boat? And when do your aerial flights begin?

A. Well, it's varied over the years. I used to spend a lot more time in the field. The bureaucracy has grown and grown and grown, and I'm, the last four or five years I've been a desk jockey pretty much. And that's partly because my responsibilities have grown nationwide, so that -- yeah, so I'm not, you know, everybody wants to come out with me and spend the day with me in the field, especially the media. And I say,

"Sorry, you know, I just" -- and they're not allowed in the airplane. So I still do the flights, because of my expertise in that, in that area.

THE COURT: You're doing them now?

THE WITNESS: I did them right up --

THE COURT: Oh.

THE WITNESS: And trained in a new person. I think he did the -- I might have missed the last one or two flights. So in this, in this time of, from 1982 through September of 2011, I think there were maybe two census flights that I was not on. I did all the rest.

BY MR. BLACKBURN:

Q. So how many census flights is that per year?

A. If we flew every week, it would be about 26 flights.

Q. And --

A. And then in recent years, the costs of the airplane has basically tripled. Federal budgets are getting tighter, so we've cut that back to probably eight to twelve flights in a season. And again, you have different objectives. If you're, if you're flying, say, in November 1st, you're looking for how many cranes have arrived, which ones have chicks. But you aren't concerned at all about a peak count at that point, because they're not all here.

THE COURT: Do you use the, not just the aerial survey, but the boat to count? You said you were a day on a

boat, a week.

THE WITNESS: Oh.

THE COURT: In a week, you would be a day on a plane and a day on a boat. Do you count it from both aerial and the boat?

THE WITNESS: The boat, no, the boat was more behavior. You have to be up in the air to get the whole picture of the distribution of cranes. Your views from the boat is rather limited. So the main work is from the, in regarding the census and all that, and population, it's from the air.

THE COURT: Thank you.

MR. BLACKBURN: Could I have the ELMO, please?

BY MR. BLACKBURN:

Q. Now, I think you have a monitor in front of you that you can see. And this is Plaintiff's Exhibit 111 that was just discussed, but I think -- do you know what's depicted on this map? Have you ever seen it before?

A. I've never seen it before.

Q. Okay. Prior testimony indicates that the red dots are in territories where there were reported deaths of adult birds, and that the yellow dot or the yellow markings on this exhibit are areas where there --

THE COURT: I thought -- no, I think the red dots are where the carcasses were found.

MR. BLACKBURN: I'm sorry. That is exactly right.

THE COURT: And the yellow dots are where birds were missing.

MR. BLACKBURN: Sorry. Got that mixed up.

THE COURT: Or actually two carcasses, a partial carcass, and a pile of feathers.

THE WITNESS: That, well, that's inaccurate then. The F, the circle F, the carcass was --

THE COURT: Would you give him the pointer?

THE WITNESS: I think I've got something --

THE COURT: There's one up there. Thanks.

THE WITNESS: This, this is accurate as far as the territory of where the family group that lost their chick, where the chick died. But the chick actually died over in this area on Dunham Bay.

BY MR. BLACKBURN:

Q. So the dot is in the right family location, but in the wrong specific location with regard -- and I think the, if I understood the purpose of this was to discuss both work -- well, just to identify --

THE COURT: The purpose of that was to show the distribution.

MR. BLACKBURN: That's right, the distribution of the deaths.

THE COURT: Of presumed deaths.

MR. BLACKBURN: And --

THE WITNESS: I just, I'm uncomfortable with that, because I haven't had time to verify it. I don't know if any of those dots are in the right place.

BY MR. BLACKBURN:

Q. Well, and perhaps I should have used a different map, because really what I was going to ask you about in a more general sense was the territories that are shown there.

A. Okay.

Q. And are you comfortable talking about those territories?

A. Yes. Those are -- those territories I delineated, yes. That's my artwork there.

Q. So you're responsible for the circles on the map and the letter, the numeric designations? Would that be fair?

A. That's correct.

Q. And were these the territories that were in effect in 2008-2009? Or can you tell from this?

A. Well, I mean, that's -- that's the way it's labeled. I --

Q. We've had those types of discussions.

A. Yeah, I assume so.

Q. Now, what I'm curious about is how do you go about your aerial surveys. Your first survey of the year, what do you do?

A. Wow, you need a -- have you asked for a five-minute briefer on census techniques? That's --

Q. Well, then let's start there.

A. Yeah.
Q. What is the goal of your aerial flight?
A. There's about, there's multiple objectives.
Q. Okay.
A. Certainly the peak population for the year, determining that as accurate as I can make it. I'm looking for which, where territories are located. I'm comparing those territories with what I found the previous year. I'm looking for which of those territorial pairs were successful parents and brought a chick or twin chicks to Aransas. As the winter goes on, I'm looking for mortality. I'm looking for any mate switches. I'm looking for habitat use on the flights. And I'm looking for pairs that leave their territories during the winter. I'm looking at which cranes are subadults. I'm looking at flock size of those subadults. I'm looking at where those subadults are hanging out. I'm looking at territories out, or movements outside the typical winter range and trying to record all that. And then throw in the color bands, we're trying to monitor individual cranes.
Q. And in terms of the types of things you're doing, are you trying to count the birds that are literally out there, or are you doing some sort of survey technique?
A. I am finding every bird, to the best of my ability. And we are covering every location where I believe a whooping crane may be. Now, the only time I don't, couldn't do that was, say

we have, say we have a late start due to fog, and there just won't be enough flight hours in the day, so then I've got, say I've got five hours to cover the whole crane area, rather than the seven hours or seven-and-a-half hours that I need, and then I make -- then I pinpoint, okay, I want to look at certain areas, and other areas I won't look at.

Q. So first flight of the year, is there, do you set a pattern that is maintained --

(Counsel conferring off the record.)

MR. BLACKBURN: Let me substitute section, map 110, and that would be a map without any dots placed upon it. And that's also in evidence, Your Honor.

THE COURT: Okay. Plaintiff's Exhibit 110?

MR. BLACKBURN: Yes, Your Honor.

BY MR. BLACKBURN:

Q. That perhaps will be a little easier on your eyes and you won't have to worry about all those dots that you --

A. Yes, thank you.

Q. And I would ask you, using Plaintiff's Exhibit 110, in terms of your first flight of the year, will you follow the same general pattern with each of your flights that you follow with the first one?

A. Yes. Yes, pretty much. Sometimes we vary it, depending on -- there are a lot of factors, depending on winds, time of day that we start. Sometimes we take off from the airport, if

it's a fog situation, and we'll take off and we'll go to the area with the best visibility. So then, but whatever area we start at, we have this divided up into sections. Each section is approximately five miles long. And I would have a map, an aerial photo type map on my lap of that particular section, and we would do basically quarter mile grids through that five-mile section, back and forth, in a systematic pattern.

Now, sometimes we would start on the bay side. Sometimes we would start on the upland side. And that depended on the wind. You always wanted to be making your turns into the wind, if you could, because there were fewer -- you could make a more accurate turn and certainly less air sickness problems for me if we were turning into the wind.

So we would do these five-mile-long grids, quarter-mile long, quarter mile wide, and the key for that quarter-mile width -- and it would vary. Again, that width of quarter mile would vary, depending on the visibility. If it was a sunny day, you can see a crane a mile or a mile-and-a-half away. And so you could easily do a quarter-mile grid.

If it's cloudy, overcast, scattered, you know fog, low clouds, you might have to shrink that width to 200 meters. Okay?

Q. Okay.

A. So you would do this five-mile section until I've covered that map that I have on my lap. And on that map is a list of

all the territorial cranes that I, that were either there the year before or that I've seen so far that have arrived so far. And I have a checklist. So as I'm flying along, if you look there at the 28, 29, 30, say --

Q. Can you take your --

A. Pointer, right.

Q. Let me see, let me try to write 28, 29, 30.

A. So we normally would start -- that's not the pointer. Actually, this would be, this would be two five-mile sections. So I'm covering from 30 to 28. And I do my first transect, make a turn and come back. And I keep working -- excuse me for everybody getting dizzy here -- but I keep working until I get to this, to the uplands and the water holes and the dirt roads where they, the cranes pick up grit. I mean, these are all the places I know where there might be a crane.

And then I've compared it with the checklist on my lap and, well, two things. In recent years, we would finish a five-mile section, and then I would look over at the pilot's GPS screen, and we would say, "Are there any transects that got too wide," that exceeded the, say, 300 meter width? If we felt, "Yeah, we got a little wide there," then the pilot would immediately do one more transect.

Then I've got the checklist on my lap, and I'll say, "We didn't see the cranes in Territory Number 28. They were there last week." Okay. We didn't see them. So we would go back

and recheck Territory Number 28. And if we have enough time, we would check the water holes or the uplands next to Territory 28, where I have experience of where those territorial cranes in Number 28 go.

So we basically try to finish that five-mile section as thoroughly as we can. And I would say in 50 percent of the cases that, say we missed the cranes in Territory Number 28. I'd say 50 percent of the time, you just go back, and bingo, there they are.

Now, they might have been at a water hole the first time when you first flew your first transect, or you flew right over the top of them. You sort of have a blind spot absolutely right in front of the plane. So there are ways to miss whooping cranes on flights. But if you know the cranes well enough, you can go back and pick up those cranes.

Now, another thing to think about is if I'm limited for time, I may not go back to Territory Number 28 to find those cranes, because I saw them the week before. And say there's two adults and a chick that I saw the week before, and this week, the next week there's nothing. Okay? Chances are I just missed them. Chances are they're still there. So I can kind of keep that in mind and then look for them the following week and use that information in my estimate of the population.

Q. So am I correct that if you -- for one, you know these territories, you know generally what to be looking for. Is

that a fair statement?
A. That's correct. And I'm the only one who knows these territories.
Q. And so you, if you, if your expectations are not met as to what you think, you'll go back and check it out?
A. Yes, sir. And we will, we will -- yeah, we search extensively. I can get pretty stubborn on, especially when I'm trying to get a peak count. And then, you know, if that's the objective of the day, then I'm going to say, "Oh, yeah, we've got to go back to Territory 28 and look."
Q. So you just don't fly over once, take a look, and keep going if you miss them.
A. No. And the other thing that's very important on your census technique is you have these little blind spots. A classic is just to the left on the pilot's side of the airplane. I'm on the right side of the plane. If I look to the left, I can't see right underneath where he is. That's a blind spot for me. Now, the pilot is helping me, he's pointing out cranes, too, but he doesn't have the training I do, and he's got to watch all those instruments. So he may have missed those cranes in that blind spot.

So what we do, we choose the transect width, make it small enough and narrow enough that I have a chance to identify cranes on two different transects. In other words, every time I fly a transect, I fly five miles, I see cranes. I turn, I

come back, and I should see those cranes again, if I'm, if I'm doing things correctly, if I've designed it correctly. So I'm giving myself two chances to find every crane.

Q. So you come to the end of a day -- or I'm sorry, would you like to ask anything, Your Honor?

THE COURT: Oh, no, no.

MR. BLACKBURN: Okay. I'm sorry.

BY MR. BLACKBURN:

Q. You come to the end of the day, will you have covered the entire territory shown on Plaintiff's Exhibit 110 in a one-day time period?

A. That is correct. It would take us now about six, a little over six hours to cover everything on that map.

Q. Does that include a refueling stop?

A. Well, that's six hours of flight time. So we are, we are flying three to three-and-a-half hours in the morning. We refuel and eat lunch, rest a little bit, and then go right back up again.

Q. And when you complete the, let's say a day's work of surveying, what do you do then?

A. I try not to die. I'm pretty tired.

Q. I can appreciate that.

A. Yeah. I mean, I, I don't get sick in airplanes, but I get a little woozy and fatigue and all that. Flying is not fun. I don't like it. I've never liked it. But --

THE COURT: Well, at least you don't have to go through airport security.

THE WITNESS: That's true.

So at the end of the flight, I would always, kind of as a reward to myself -- this is irrelevant to the Court, but this is what happened. I would go to my favorite pizza place, just chow down, overeat, and have a diet coke about two-quart size, I think. And the reason was I was tired, but I wanted to look at the data that evening.

So after eating supper, I would lay out all the maps on the kitchen table, and you go through each crane sighting that you saw that day, and you make sure from your memory that you didn't make any mistakes. In other words, were there any cranes that you, that you saw that you failed to mark? Were there any question marks? Were there, you know, just, what do you call that? Editing, proofreading, I guess. And it's all relatively fresh in your mind. You really don't want to sleep on it and then try to remember the next day of, "Oh, did that crane, did that crane fly from the bay to the uplands as we were flying past?"

The other thing we do on census flights, I'll go on and on and on. You just cut me off when you've had it.

BY MR. BLACKBURN:

Q. I think I'm still learning, so --

A. If you encounter, when you're flying these transects, say,

say you see two cranes in flight, what do you do then? Well, we would generally break off our transects and follow them, because I want to know where they're going. I want to know if they're territorial cranes, are they going to a water hole, are they doing a territorial dispute with another set of cranes. And that was sometimes the case. They would take off to be chasing other cranes out of their territory. So you would get multiple movements.

Sometimes on your transects, you would get, you know, four to six to eight cranes leaving the salt marsh and going to a water hole, or to a prescribed burn. You may have cranes on the burn coming back to the salt marsh. It can get, you know, at times it can get chaotic, and there can be so much crane movement that you can say, "I'm just not going to get a peak count today. It's just too confusing now." What you can do is you can start that five-mile section over and, you know, try to get a count again, you know, without all the movement, but you make that decision on whether you have time. And again, you may not have time to redo it.

Q. So are there times when you feel more or less, I guess, secure or confident in the results of a day's flight?

A. Absolutely. Absolutely.

Q. And how do you handle that situation?

A. Well, that's the beauty of flying every week, because every week builds on the week before. And because the

distribution -- I know these cranes. I mean, they're coming back to the same ponds. I've been watching some of the same cranes since 1982. I mean, they're -- I mean, I hate to be, what's the word, anthropomorphic or whatever, but it's almost like they're my kids out there. I mean, I know these cranes, and I can look at -- I don't just see two white cranes.

I was in a boat last Saturday. In fact, it's the first look I've had at whooping cranes since I retired. And we came on cranes, and I saw a family group, and I said, "Oh, yeah, that's the Ayers Island family group," you know. And you know, they're individuals out there. It's not just, it's not like a deer census, where you're just -- or a deer survey, where you're going along and you're not recognizing individuals. And that individual recognition helps me build from week to week on what is out there.

Q. Now, more recently, you have not been doing weekly flights.

A. That's correct.

Q. And does that make the job more difficult?

A. That's correct, and it reduces the accuracy.

Q. And --

THE COURT: Since when?

THE WITNESS: I'd say the last five years we've kind of gone to eight to twelve flights a year, something like that. I'd have to look it up in my, those annual reports.

BY MR. BLACKBURN:

Q. And when you say "reduce the accuracy," what, how do you mean that term? I mean, is it, are you going from 50 percent to 30 percent, or are you going from 80 percent to 60 percent, 100 percent to 95 percent? How is that --

A. Well, when I flew it with pilot Tom Taylor, he -- it's very important to have a consistent pilot, because you're training in that pilot to maintain those transects, and you're also training in the pilot to recognize whooping cranes. In fact, on the real dense areas of the cranes, crane areas, say the refuge, I've been so busy marking down crane locations, you know, there's two on Mustang Lake, there's two on Mustang Slough, there's a family group on Rattlesnake Island.

The pilot sometimes goes, "Tom, there's two." And I, I immediately -- and I mean, within a half second or something, I draw the circle on the map of where those cranes are, and you know -- because you can't be looking down on your lap. You've got to keep looking out there.

But the pilot sometimes says, "There's two," and I mark it. "There's two." You know, "There's two." You know, when the visibility is good, these cranes are five feet tall. You can see them a mile or a mile-and-a-half away. You know, and it's just, "Oh, yeah, there's two. There's two. There's a family," you know. And I'm just, you know, I'm just hard at it recording, and the pilot's spotting and I'm spotting, and you

know.

And then you've got to make sure, you know, is one a chick? And sometimes you fly right over a family and you might see the two adults and not see the chick. And then I'll look at my checklist and I'll say, "Oops, they're supposed to have a chick. Let's circle back." And lo and behold, you circle back and boom, there's the chick, and you flew right over the top of it. So --

Q. So in the more recent flights, like during 2008-2009, if you -- you know, once you've flown three or more serious census flights, do you feel like you've got a 75 percent detection rate or better?

A. Oh, sorry. I forgot the question there. What I was leading up to is in those years when I did the work with Tom Taylor over, I think, 11 or 12 years and published the paper on census techniques, the average came, from what I calculated as the total population, we were finding 95 percent of the cranes on every flight. All right?

So if I found, let's just say there are 100 cranes out in the population, that's my estimate. On any given day, it averaged out over these 11 years that I would find 95, 95 out of 100.

Okay. So you know, I'm not a statistician, but if every week I'm seeing 95 percent of the cranes, and a different 95 percent, it's kind of like putting a jigsaw puzzle together,

that you're bumping up closer and closer to 100 percent accuracy.

And I've always felt that in a good year, my accuracy is probably 1 percent, that I'm -- that my peak count is an error rate of 1 percent. In a chaotic year, where the cranes are really moving a lot and going to water, I'd say the, the accuracy probably drops to about 3 percent error.

Q. So 97 percent?

A. 97 percent. That's -- yeah. So that's why I think of it as a census, where we're seeing, we're basically doing our very best to find every bird.

Q. And so during 2008-2009, over a period of time, you feel like that you were in the 95 percent range?

A. Well, more, better than that. Probably the 97 to 98 percent accuracy.

Q. And --

A. Now, it's very important, when -- you know, I've heard earlier today that, you know, people saying there were 270 whooping cranes in the '08-'09 winter. Well, what we're really trying to say is it's 270 cranes, plus or minus, say, 2 or 3 percent. You don't tend to say that when the New York Times calls you up wanting to know how many whooping cranes there are. You just say there's 270, and that's what they want to hear.

THE COURT: Plus or minus 2 percent?

THE WITNESS: 2 or 3 percent, somewhere in there.
BY MR. BLACKBURN:
Q. A bird or two?
A. What's 3 percent of 270? I don't know.
Q. Six birds?
A. Six birds, yeah.
Q. The level of precision, do you feel like, for example, once you start establishing mortality, do you feel like the mortality is as precise or more precise than the population statistic in terms of peak population?
A. Yes. The mortality is -- yes, it's derived completely different methods. It's not relying on your total count. I don't go up and -- say there's 270 cranes, and I go up one day and I only found 250. I do not announce that 20 whooping cranes have, are missing and have died. Completely different methods. The mortality is not based on the count that I'm getting that day. The mortality is based on behavior, crane behavior, of what I have been observing for 30 years.
Q. And so would it be fair to say that the mortality estimate is something that you have developed a base of knowledge, an understanding of territories, of habits, of what you expect, what you have seen during the year and then changes off of those observations?
A. That's correct.
Q. So it would be an observational result, based on a

methodology that's replicated year after year?
A. That's correct. And it's entirely based on what one expects, what is typical whooping crane behavior. For example, we know they come back to the same territories every year. But every time I make a statement like that, I could talk two or three minutes on exceptions, because there's always exceptions in biology.

So you have to be a little bit careful. There's territories that are split territories. They may spend a month on Mustang Lake, and then every third day go over to San Jose Island or something like that. But that's what you pick up in your weekly flights, and that's the type of knowledge that I have accumulated over 30 years that I'm worried that the crane biologist now, there's no, there's no fix other than to put him in the airplane and let him start developing that same type of knowledge.
Q. So it is something that's based on your experience over the years, as well as methodology?
A. Correct.
Q. Now, there's been a lot of, I'm sure you've heard some of the discussion, there's been a lot of talk about 23 birds dying in 2008-2009. Is 23 your number?
A. If I had to pick a number, it would be higher than 23. There, there were 92 subadults in the population in the '08-'09 winter. The only way I could detect loss of a subadult was

either by finding a carcass of a subadult or by finding an injured bird that looked so darn sick and then disappeared.

In fact, one of the 23 mortalities that I documented was a very lethargic bird that was, I believe, sick for eight or ten days. The tour boats were watching it. It was feeding, almost none at all. I think they one time saw it drink. And I went out to check it out, and that bird wasn't there. And the most likely scenario, in my mind, was that bird didn't make it.

Now, that's, that's not as strong as finding a carcass. There's a little room for error there. But there were, say, 70 -- well, of the 92 subadults, I had no way -- if one subadult is missing -- subadults move all around the wintering area. They can be on the refuge one day, they can be, you know, they can fly across the bay to San Jose the next day, or the next hour. And their group size is different. They can be singles. They can be in groups of five. So you can't ever tell if a bird like that is missing. Okay?

So I had 92 subadults, and I have no way of knowing really how many of those subadults died. So I am, I am, you know, it's very reasonable to assume that some of them died that are not in that 23 that I, that I detected. So you know, I conclude that more than 23 died in that winter. So I say, if you ask me how many died, I'd say 23 plus.

Q. Now, so to understand your testimony, the 23 number you actually consider to be a conservative number?

A. Well, I think it was a good, a good estimate based on the adult mortality and the juvenile mortality, because the adults, if there's two adults in a territory, and then all of a sudden I go out and there's only one adult in that territory and I don't find them anywhere else on the wintering range, I have a pretty good idea that one died.

Now, it -- it's a little tough with pairs. It's a lot easier with families. Say I go out and there's two adults and a chick. Okay? There's two ways on these families to detect mortality. And in the '08-'09 winter, there were 70 adult pairs, and I believe 36 chicks that were at the Aransas, there were two chicks, one in Oklahoma and one that headed south apparently. So I really haven't, I had a good chance of detecting mortality on the 70 adult pairs, that's 140 birds, plus 36 chicks. So what's that, 176 out of the 270 total birds. I had, I had a chance, a pretty good chance of finding mortality.

Now, the rest of the birds, I didn't. So when -- so if we look at, you know, so of the birds that I could detect mortality on -- what was that number I just gave you? I forget.

THE COURT: 176.

BY MR. BLACKBURN:

Q. 176.

A. 176. I, in my best judgment, found 23 of them to have, be

missing and have died.
Q. And there's another group that you just really can't do much with. Is that --
A. I just, there's no chance. There's no chance. The subadults move too much. The only way would be is if I happen to stumble across a carcass.
Q. Now --
THE COURT: What is a subadult? Does that include the chicks?
THE WITNESS: No. The subadult is something, basically we call it a nonbreeding crane, but in white plumage. So it's basically, the easy way to think of it is one, or one, ages one to three, or ages one to four. And they are like teenagers. They aren't really breeding yet. They're hanging around the edge of territories and just foraging and get chased off by the adults.
And then in those subadult teenager groups, that's where the paring sometimes, the socialization begins, and that can lead to pair formation.
THE COURT: So how many chicks would have been in that 270?
THE WITNESS: Well, of the 270, there were 38 chicks in the population. And I was regularly monitoring 36 out of those 38.
BY MR. BLACKBURN:

Q. And you go over a territory, let's say a chick, a juvenile is missing.
A. Okay.
Q. You circle back, you check it out.
A. Right.
Q. Don't find it. You get home that night, what do you do?
A. Well, I --
Q. Or have I skipped a bunch of steps?
A. Well, you skipped the step of, you know, I'll circle back immediately to see if I just overlooked the chick. But normally sometime later during the flight, maybe two or three hours later, I'll make another pass through that territory to see if that chick has, you know, maybe the chick was sitting down at the time and I missed it. Maybe it was 100 yards away from the parents and I missed it. So I'm, I'm taking several looks at that territory.

And then I'll notice, okay, in my notes, in my report I'll put, "Mustang Lake chick missing, not located." Okay. That next flight I do, the top priority I have on that next flight is I, you know, I'm darn well sure going to look for that Mustang Lake chick. And if it's foggy and I have two hours of flight time, I'm going straight to that Mustang Lake chick.

Now, if I have two flights like that where I didn't see the chick, and I, and at the same time I haven't found that chick anywhere else in the wintering area, okay, so -- because

you always wonder, well, maybe it just moved off a couple hundred yards or something.

Because there is documented, and I've seen this, especially late in the winter, just before the spring migration, a chick will sometimes separate from his parents. We've also had an instance where there was a re-pairing that occurred during the winter, and one of the new mates kicked out the chick from the family group. So all of a sudden, there was a chick wandering around the wintering grounds.

Okay. Well, I'm detecting that. Okay. This pair is missing their chick. But lo and behold, a mile away I've got a chick all by himself. Okay, I just conclude, well, that chick is the one that was with the family, now he's over there by himself.

Now, that's a very, very rare situation. I think I've only encountered that, I want to say less than five times in 30 years. I mean, the chick is always with the parents. The only exception is in the spring migration, sometimes the parents will migrate and leave the chick behind. And so now I've got -- but I wouldn't declare a chick missing in that case, because I know the parents are gone. And then I have an extra chick in with the subadults. So I know, oh, yeah, this chick, the parents have left and there the chick is. So the only way I'm going to declare a chick is missing is probably on two or even three consecutive flights.

And one of the things that happened in the '08-'09 winter is we were noticing chicks separating from their parents. And when I mean separate, I mean by -- they were usually remaining in the territory, but they'd be maybe 300 yards from the parents, or 400 yards away. Very unusual.

And in the instance of one of the carcasses recovered, one of the partial carcasses, that chick, I saw the parents on, in the salt marsh, and the chick was at a fresh water dugout. So maybe, maybe they had all been at the dugout and the parents flew back to the salt marsh and the chick stayed at the dugout.

So the next time I flew -- well, I'd have to look at my notes on how many times I saw that chick by itself. But I think within a week or ten days, the refuge staff had gone to that dugout and found the carcass. And the wing was on the shoreline, and the rest of the carcass was in the mouth of an alligator. That was the exact pond where I had seen that chick by itself with the parents over in the salt marsh.

So there's a -- you know, now if that -- we found the carcass in that instance, so we knew exactly what happened. If I had done my next flight and I had seen the parents and I didn't find the chick, well, that's where I conclude the thing's missing and the thing is dead.

Because we have no record in the, since 1937, and we've been flying, we've been monitoring whooping cranes since 1937 and doing, you know, regular flights since 1950, whooping crane

chicks do not leave their wintering grounds. They do not leave their territories. I mean, there they are. So it's just a question of finding them.

Q. And so --

THE COURT: Since when did you say, 1930?

THE WITNESS: Well, the refuge established the end of 1937.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. Now, you've mentioned chicks separating in their territory. Did this happen on more than one occasion that you noticed this physical separation from the adults?

A. Well, there were -- yes. In the '08-'09 winter especially, I think there were -- I'd have to refer to the report. I remember, I think, four instances. One was a chick that ended up on the tour loop, on the pavement. And he was very unwary of cars and very, very unusual situation. And his parents were over, you know, a mile or two away.

And I went out and checked on him, and he flew okay. Looked okay. I mean, so you couldn't catch him. I mean, I would have loved to catch him to run all kinds of medical tests on him, because I was convinced something was wrong. But then he was reported, after three, four days on the tour loop, he was reported about a mile north of the refuge all by himself, by a landowner up there. And then he disappeared. He was

never seen again. So he died presumably just north of the refuge.

Now, you could conclude that, well, maybe he started the migration early or something, or maybe he wandered around South Texas for the rest of the winter. But we just don't have any records of that. We, you know, and if a bird did that, there's a decent chance that my phone is going to ring, because remember, I'm on this sighting network, and the public gets my name off the internet and e-mails me and says, "I've got a whooping crane in my backyard."

So a lot of the birds that, if they did wander off, we have a pretty good chance of, that somebody at some point, you know, during the next two or three or four months, would call them in.

And like I said, in all the history of monitoring whooping cranes, this just hasn't happened. Chicks do not separate from their parents and survive, in -- once they're at the wintering grounds. Now again, there's an exception. In migration, whooping crane juveniles on the way south in the first fall will sometimes get separated from their parents. Now, those whooping crane juveniles will winter usually with sandhill cranes. They can be in Oklahoma, they can be in Colorado, they can be in North Texas. We had one go all the way to the Valley one time, in -- I can't remember the name of the town, but it was 50 miles from Mexico or something.

So, and that's, that is, that doesn't surprise me. I mean, when I get a report of a loan juvenile in Colorado, I know what's happened, he's separated from his parents. But the ones that make it to Aransas, they're going to stay with their parents that whole first winter.

Q. Now, you've mentioned, I think, on several occasions the 2008-2009 struck you as different than other years. Is that a fair statement?

A. Yes. There's been other, there's been a few other years similar to '08-'09. It was an unusual year, yes.

Q. And what is an unusual year. You know, you obviously are very much attuned to each of these pairs, and certainly the pairs in their territories with their juveniles and things. What are you seeing that makes you think "unusual"?

A. Well --

Q. You mentioned the chicks separating from the adults in the territory. Are there other things?

A. Well, certainly that's extreme instances. That's, yeah, that's off the scale unusual. First thing I'm looking at is the amount of movement, the amount, the amount the cranes are leaving the salt marsh and using uplands, whether that movement is connected to visiting water holes. That, that is a trigger in my mind of what I would call unusual.

In most winters, the cranes are right in that salt marsh. The censusing of cranes, I mean, they are five feet tall.

Right? It's pretty hard to miss them. You've just got to keep your eyes open. And a lot of times you'll fly one week and you'll fly the next week and the cranes are within a hundred yards of where they were before. I mean, these are, these are -- it's not difficult.

And so if I see lots and lots of movement going on, that triggers, that tells me this is, something's going on, there's something unusual.

Q. Was there a lot of movement in 2008-2009?

A. Yes, a lot of movement.

Q. And I think you'll probably see on cross-examination a number of e-mails where you were, I think, expressing a little confusion and a little chaos out there in the field.

A. Right. Right.

Q. Is that, you know, did that happen? Was it chaotic out there?

A. Yes. Yes.

Q. And how did you deal with it? I mean, it's already been thrown up as, you know, look, chaos everywhere. How can you trust any of this stuff?

A. Because you fly the next week, and you fly, and you fly the week after that. And we didn't have budget to fly. And I told my boss, "Look, this is a bad winter." Every time I did a flight, there were more birds missing, concluding more birds were dead, and I told my boss, "We've got to fly. I don't care

where the money's coming from. Take it from another program. We got to fly." And every time I'd get a flight, it's like more birds were missing.

And again, that helped me, because it created more flights and helped me with the pattern and helped me try to determine the peak population. And it certainly was -- the more I flew, the more I found missing cranes. And when I say "missing cranes," I mean dead cranes. They're the same. It's the same vocabulary in my book. There's absolutely no doubt.

THE COURT: So were you flying once a week?

THE WITNESS: No, I never got to that. Probably every other week. It was costing us, oh, what's 600 times $350? That was a weekly flight cost. Plus two hours taxi time. So eight, eight hours times $350.

MR. BLACKBURN: That's at least 200,000, I think.

THE COURT: That's not good.

BY MR. BLACKBURN:

Q. So y'all found the money to do what you, at least some of what you felt needed --

A. Right.

Q. -- to be done?

A. Right. It was a compromise. I mean, I would have loved to fly every week. I mean, that's what we really needed, but you just couldn't do it. And then there were questions on the availability of the pilot. This pilot that we were using that

winter, his primary job was to fly medical flights of cancer screening drugs every morning from Houston to McAllen. And he'd pick the drugs up at 5:00 a.m. and deliver them to the hospital at 8:00 a.m., and they'd be running cancer screening tests at 9:00 a.m. or 9:30. He had two airplanes. So hopefully he could send his other airplane and his other pilot to do the cancer run and come and spend all day with me with the cranes.

Now, if he had to do the cancer run, he could come back through Rockport on the way, on his way back to Houston, and we could do four hours of flight time.

MR. BLACKBURN: Now, Your Honor, can you instruct the witness as to how to use the magic wand that Dr. Sass got to utilize?

THE COURT: The tip of your finger.

THE WITNESS: Oh.

MR. BLACKBURN: And you can touch the screen, and what --

THE COURT: Give it a try, and I'll erase your first efforts.

THE WITNESS: Actually write on it?

THE COURT: Yeah. Use the tip of your finger.

THE WITNESS: All right. Okay. There it goes.

THE COURT: Okay. Now I'm going to clear it off.

THE WITNESS: Okay.

THE COURT: Got an idea now? Okay?

THE WITNESS: Amazing.

BY MR. BLACKBURN:

Q. What I'm going to ask you to do is to make a mark. I'm going to go through a list of mortality that you have identified in your October 2009 report. And I'm just going to ask you about each of these and ask you if you could mark those on this map. And you know, some of the areas are small, but --

THE COURT: This is the following year?

MR. BLACKBURN: This would be, no, 2008-2009.

THE COURT: Oh, you said October of 2009, I think.

MR. BLACKBURN: I may have. I may have said that. If I did, I misspoke. I meant from 2008-2009.

THE COURT: Maybe it was published in October of 2009.

MR. BLACKBURN: It did. It was.

THE COURT: Okay.

MR. BLACKBURN: That's right. It was the report for 2008 --

THE COURT: For the previous, okay, for the previous winter. Got it.

(Counsel conferring off the record.)

MR. BLACKBURN: Okay. Let me, Your Honor, just show you that the same data is shown on 432. Is that right, Jeff?

MR. MUNDY: Plaintiff Exhibit 32.

MR. BLACKBURN: 32. I couldn't read that.

MR. MUNDY: I think --

BY MR. BLACKBURN:

Q. You have, these are the, these are the individual reports that came from your annual report. Does that look familiar to you?

A. That's correct. Yes, that's mine.

Q. But let me put the map back up and --

THE COURT: Do you want to show him that other --

MR. BLACKBURN: This one?

THE COURT: Yes.

MR. BLACKBURN: May I?

THE COURT: Yes. Any objection, Mr. Fernandes?

MR. FERNANDES: No, Your Honor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. You could keep that. And basically, if you would then basically identify, on December 1st, there was the --

THE COURT: Make -- just a second. Make sure you don't mark on that piece of paper, please, sir.

THE WITNESS: Okay.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. On December 1st, there was the first crane mortality reported for 2008-2009, "Two-year-old male with bad knee

captured at refuge boat ramp and died en route to vet." Where would that be?

A. That would be roughly there.

Q. Okay. And --

A. And at the bottom, the bottom of that line is where I found the carcass.

Q. And was that bird alive or dead at the time you found it?

A. It was alive.

Q. And there's a picture of you carrying it out.

A. That's correct.

Q. And I believe there's been some discussion about the fact that the bird had a bad leg. Was that, is that right?

A. That's correct.

Q. Had you observed the bird before you found it in the field?

A. No.

Q. So that was really the first time you had encountered that bird?

A. Right.

Q. And you carried it to the vet, but it died on the way. Is that right?

A. That's correct.

Q. And then on December 29th, you reported South Sundown -- I'm sorry, was that two -- your first, the first crane, was that a mature bird?

A. Yes. I think the, I think the necropsy showed some, a few remaining juvenile plumage feathers, so that would make it a two-year-old. So we would call that a subadult.
Q. Subadult. And that one you could identify because there was actually a carcass?
A. That's correct.
Q. And then South Sundown Island, "Juvenile found missing on aerial census." Where is South Sundown Island? Could you indicate the approximate area of that?
A. Well, the easiest way to do this is if you could pull up Table 2 from this report, maybe I can look at it here.
Q. You've got the report.
MR. BLACKBURN: And the report, Your Honor, is Plaintiff's Exhibit 22.
THE COURT: Okay.
BY MR. BLACKBURN:
Q. Or if you would like, we could --
A. So if we look up South Sundown Island, it is Territory Number 15. So I will mark 15.
Q. And again, with this bird, missed on multiple counts?
A. Yes. Yes.
Q. So you went through your methodology, that's how you found the bird.
A. Right.
Q. This January 8th --

A. And this was, this was early in the winter, so I mean, it was missing the entire rest of the winter.
Q. But you had, you had seen it to begin with.
A. Yes, that is correct.
Q. So it was verified as being there, and then missing the rest of the winter.
A. Correct.
Q. January 8th, "Unknown number 1 juvenile, missing on south end of Matagorda Island."
A. Wait a minute. You said, Unknown number 1." That's Number 47. And it's right there.
Q. Now, that was a juvenile. Why did you call it unknown?
A. Unknown because I hadn't seen the pair as a territorial pair the previous year. So it surprised me that this, all of a sudden there was a territorial pair, and in this case, it was actually a family group there. So I called it unknown because I hadn't named it yet basically.
Q. All right. So that's sort of like anonymous?
A. Yes, that's correct. Anonymous number 1 on Matagorda Island.
Q. Same, same question. You went back, you looked for it more than one time and didn't find it --
A. That's correct.
Q. -- after having sighted it?
A. That's correct. A little trickier with anonymous pairs,

because they, they really may not have really established a firm territory yet. Some of the new pairs tend to get bounced around a little bit by some of the adults.

Now, this particular cranes, they were bouncing around a little bit, but they always stayed on the south end of Matagorda Island there. So I would always find them, say, between 45 on that map -- it's hard to read the numbers, but certainly I can read 41 there. So it was kind of on that south, extreme south end of the island.

Q. And January 8th, same flight, or anyway, certainly the same day, "West Shell juvenile missing on Matagorda Island."

A. Right. West Shell, that's 48. I just can't read the numbers well enough on that map. Can you see a 48? It should be --

THE COURT: Why don't you zoom it up. Of course, it will mess up all his annotations.

THE WITNESS: There it is, I think. Yeah, this is it.

THE COURT: So you want me to clear off the annotations then?

MR. BLACKBURN: No, Your Honor. You were talking about the red mark?

THE COURT: Yes.

MR. BLACKBURN: Oh, you're right, I did. Yes, please.

THE COURT: You want to start again?

MR. BLACKBURN: No. Well, I just, I'm really doing this for illustrative purposes.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. 48, could you just put a mark there, we can just kind of see generally.

A. I think it's this one.

Q. There. And same question about that. Did you -- there were two then missing in the same general area that day?

A. Yes, that's correct.

Q. And so you were looking around for those? I mean, is it unusual to lose two birds on one, you know, on one flight?

A. Extremely, yeah. And we covered that, you know, we covered that whole south end very, very thoroughly, because we, you know, you were not only looking for one, you were looking for two. You know, so we covered the uplands and the road and all the way to the Gulf.

Q. January 11th, "Mustang Slough, juvenile, separated from its parents, who were sighted close to vehicles." This is the one you were describing earlier in your testimony about being on the tour loop road.

A. That's correct.

Q. And you're going to show us where it originated, where its home territory was?

A. Right. It says, "Mustang Slough." That's Number 4.
Q. Do I need to -- oh, there it is. Okay.
A. And the tour loop is -- well, just the straight --
THE COURT: You can use the pointer on that. How about that?
THE WITNESS: Pointer on that? Okay. I'll get it right -- there's the -- this is the tour loop. So we saw it --
THE COURT: Where's the observation post?
THE WITNESS: Observation post is up here.
THE COURT: Okay.
THE WITNESS: The big tower.
THE COURT: Yeah, the big tower.
THE WITNESS: This road, it was actually on a part of the tour road here that is open to the public, right about there.
BY MR. BLACKBURN:
Q. And January 14th, juvenile carcass of RYBY pair found by Dunham Bay.
A. Correct.
Q. January -- where's Dunham Bay? And tell me if I need to zoom back out, so --
A. Dunham Bay is off the map right there.
Q. And if you would erase again, Your Honor?
A. There you go. This is, this is Dunham Bay. And the, their territory is over here. And this pair has a history of

bouncing over to the refuge occasionally. So I wasn't surprised that, that they had been seen in the Dunham Bay area. I mean, that occurs several times a winter usually.

Q. But this was a carcass that was found?

A. This -- yes. Right.

Q. And you know which one it was?

A. Yes. The, one of the adults was color banded, so we know exactly which cranes they are, and we know their nesting history. That's the beauty of these banded birds. We, when I see them -- oh, I'm sorry.

THE COURT: Sorry, Ms. Gano.

THE WITNESS: I need to keep my hands in my lap.

BY MR. BLACKBURN:

Q. That's also been a recurring issue.

A. But we know, we know, for example, the lobstick pair, which is right on Dunham Bay, which we've been watching for 30 years, we know exactly where they nest in Canada. So I can tell you, look it up and tell you exactly how many chicks they have brought to Aransas and the productivity of that pair.

Q. "West Brunded (phonetic), juvenile missing on south end of Matagorda Island." This is January 29th.

A. Number 45?

Q. Can you find 45?

A. I thought we already had a 45. There it is. No. We had a 48.

THE COURT: You had a 48.

THE WITNESS: We had a 48.

BY MR. BLACKBURN:

Q. Okay. And East Welder juvenile missing January 29th.

A. East Welder is 68. Right there. Long nesting history on that bird. We had been watching that one years and years and years.

Q. Once again, missing several flights, check it out --

A. That's correct.

Q. -- sure about it.

A. That's correct.

Q. January 29th, "One adult missing on Panther Point uplands on Matagorda Island from one plus one group."

A. Right. There's a case where -- I don't know they have that designated.

THE COURT: We're getting close to closing time.

MR. BLACKBURN: Would you --

THE WITNESS: Yes.

MR. BLACKBURN: I'm happy to --

THE COURT: No, you tell me. You've got another three or four minutes.

MR. BLACKBURN: Well, I've got a -- I'm about halfway down this list, so --

THE COURT: Okay.

MR. BLACKBURN: It will take longer than three or

four minutes to finish it, so we will stop somewhere in the middle. I could just as easily stop now.

THE COURT: Okay. You want to come back tomorrow then.

THE WITNESS: Oh, I --

THE COURT: 8:30. You don't want to, but will you please?

THE WITNESS: Absolutely.

MR. BLACKBURN: Thank you, Your Honor.

THE COURT: Thank you all very much. Anything else to take up besides, before we break?

MR. WILLIS: A couple of housekeeping off the record, if that's okay, Your Honor.

THE COURT: That's fine. You can step down. Thank you.

MR. WILLIS: Your Honor, I apologize, but before I, before it's my turn on the hot seat, I just wanted to ask you to clarify if you would, on cross-examining a witness, but -- what I'd like to be able to do is ask the, is ask the witness to essentially create, or whether or not I use the witness's testimony to draw a drawing, so it won't be a previously admitted exhibit, but then I can tender it to the other side afterwards and --

THE COURT: Yeah. Have them do it on the ELMO --

MR. WILLIS: On the ELMO?

THE COURT: -- which will make it easier.

MR. WILLIS: Okay.

THE COURT: Right, Ms. Cayce, and we can print that from the ELMO?

THE CLERK: Yes.

THE COURT: Just having trouble printing it from --

MR. WILLIS: No, that will -- I'm used to the ELMO. I'm used to the big easel, but I know I can't do that, so I'll go with the ELMO.

THE COURT: Isn't this better than the easel?

MR. WILLIS: I like the ELMO. Thank you.

THE COURT: Anything else?

MR. MUNDY: Your Honor, Exhibit 372, the copy of the Allen book, this is my personal copy. The only copy I have with me. I'm trying to obtain a spare, have it overnight. I was going to seek the Court's permission to take it with me tonight. If not, I can leave it with the Court and try and get a duplicate copy. I will in no way alter it, I assure you. But -- I can leave it. Okay, I'll just leave it with the Court till I get the replacement.

THE COURT: If it's okay with opposing counsel, it's fine with me.

MR. FERNANDES: That's fine with us.

THE COURT: You want to overnight another one?

MR. BLACKBURN: We're --

MR. MUNDY: I'm trying to track one down right now.

MR. BLACKBURN: We've made arrangements. Mr. Mundy is about to shoot me for asking him to put his signed exhibit into the record, so --

MR. MUNDY: We're going to have you one here hopefully tomorrow or the next day.

THE COURT: Where have you looked for one?

MR. BLACKBURN: We're getting, there's several up at the International Crane Foundation, and they're --

THE COURT: Okay.

MR. BLACKBURN: And they're shipping us copies.

MR. FERNANDES: We've got a copy that you could make tonight if you want.

MR. WILLIS: Your Honor, along that line, although that's a learned treatise, I anticipate statutes, Texas statutes will be discussed. I'd like to be able to put them on the ELMO to show them. I understand that's not something that would normally go into evidence, so I'll leave it up to you how you want to handle that.

THE COURT: Why don't you just go ahead and mark them.

MR. WILLIS: Okay, I'll make copies of the statute --

THE COURT: It's not going to be -- it's not going to be objected to because they're statutes.

MR. WILLIS: I don't have a problem with that as long

as that's how you want to do it.

THE COURT: It's kind of nice for me to have them there to look at.

MR. WILLIS: Okay.

MR. BLACKBURN: I have objected to a lot of Texas statutes.

THE COURT: You have? I find several objectionable myself, but --

MR. MUNDY: Thank you, Your Honor.

THE COURT: Thank you all again for another good day. 8:30 all right?

MR. BLACKBURN: 8:30 is fine, Your Honor.

THE COURT: Okay. Are we going too long? Or, you know, y'all tell me if this is too much.

MR. BLACKBURN: I think we're all anxious to try to move down the road, so at least speaking for our side, I think we're fine with what we're doing.

THE COURT: We can modify the hours tomorrow, if you think about it, and we can go 8:00 to 5:00, or I mean 8:00 to 5:30, or something even longer.

MR. BLACKBURN: 8:30 to 6:00 is fine with me, and I like the lunch time as well, so --

THE COURT: I think it's hard for this many people to go out and get lunch and come back. There's security and all other problems, and -- sorry about that. So that's a good

idea. Thank you.

MR. BLACKBURN: Thank you.

(Proceedings concluded at 6:01 p.m.)

I, court approved transcriber, certify that the foregoing is a correct transcript from the official electronic sound recording of the proceedings in the above-entitled matter.

/s/ Molly Carter
Molly Carter

January 27, 2012
Date

INDEX

IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	*	CIVIL ACTION
PLAINTIFF,	*	CA-C-10-075
VS.	*	
BRYAN SHAW, ET AL.,	*	CORPUS CHRISTI, TEXAS DECEMBER 7, 2011 8:33 A.M.
DEFENDANT.	*	

* * * * * * * * * * * * * * * * * * *

TRANSCRIPT OF BENCH TRIAL - DAY 3

BEFORE THE HONORABLE JANIS GRAHAM JACK
SENIOR UNITED STATES DISTRICT JUDGE

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(The proceedings began at 8:33 a.m.)

(Call to Order of the Court.)

THE COURT: You can be seated. Thank you. Okay, Mr. Stehn was on the stand. And he came back.

MR. BLACKBURN: He did.

THE COURT: Good morning.

MR. BLACKBURN: Good morning, Your Honor.

THE COURT: Good morning.

MR. BLACKBURN: Are you ready to proceed?

THE COURT: I am.

MR. BLACKBURN: May I have the ELMO, please?

TOM STEHN, PLAINTIFF'S WITNESS NO. 5, SWORN

DIRECT EXAMINATION (Continued)

BY MR. BLACKBURN:

Q. Now, Mr. Stehn, I think when we had left yesterday I was asking you about various of these mortalities that you had put into your report. And I think actually, were you looking at a copy of an exhibit up there?

A. Yes. I have --

Q. Is it still up there or --

A. Yes, I have everything --

Q. Okay, good.

A. -- I had yesterday.

Q. Excellent. And I'm not sure exactly where we were. I think we were at January 29th.

MR. BLACKBURN: And Your Honor, my intention with Mr. Stehn, if we can do it, is I'm going to get him to mark things as we go through, and then at the end I'm going to ask him to go back through and compile a single exhibit that we can then take a photograph of that would have his markings of the spots, so --

THE COURT: Sounds good.

MR. BLACKBURN: So we'll have a permanent record. But as we go through, I think he's going to perhaps go, zoom in and out like we did, and I know that's difficult, so --

THE COURT: Well, if you're zooming in and out -- it depends on where he makes the marks. If he makes them on different zoom levels, we're not going to have a permanent record.

MR. BLACKBURN: No. What I'm saying is to locate them, he may need to zoom, I may need to zoom in.

THE COURT: Perfect.

MR. BLACKBURN: But at the end, he can go back through, I think, and -- it may take five minutes or a little bit, but he can just go back through then and make his permanent record.

THE COURT: It would have been helpful if you had done that last night.

MR. BLACKBURN: Yes, Your Honor.

THE COURT: I know y'all have nothing else to do.

MR. BLACKBURN: We thought we had done it with an earlier exhibit, and an alternative way is to look at that exhibit and just -- there is a, I think one red dot is out of place. And we can look at that and see if that works. We think it is correct.

THE COURT: I guess instead of reading them all off, why don't you just let him look at them and mark them all. Does anybody object to that?

MR. FERNANDES: No, Your Honor.

THE COURT: What do you think?

MR. BLACKBURN: That would be great.

BY MR. BLACKBURN:

Q. If you could, Mr. Stehn, starting with, let's just --

THE COURT: Have you got colored pencils?

MR. BLACKBURN: Do I?

MR. MUNDY: I have highlighters.

UNIDENTIFIED SPEAKER: Yes, Your Honor, I have a red pen.

THE COURT: What color?

MR. BLACKBURN: Blue, pink, orange, red, red pen.

THE COURT: Why don't we call -- are we going to do, what, juveniles, I mean, subadults, chicks and adults? Or how do you want to do them?

MR. BLACKBURN: I think it will -- subadults, chicks and adults would be fine.

THE COURT: So give him three colors and let him mark them with, along with your script there. How would that work, Mr. Stehn?

THE WITNESS: That's fine, unless, unless somebody else can mark it for me and I just tell them what to mark.

THE COURT: You mark it.

THE WITNESS: I mark it? Okay.

THE COURT: I think it's easier.

THE WITNESS: Okay.

THE COURT: How many copies of that exhibit do you have?

MR. BLACKBURN: I'm not sure, Your Honor. Could you get copies of Plaintiff's Exhibit 110 and 111 both is the --

(Counsel conferring off the record.)

THE COURT: Ms. Cayce, take that back and make several copies, in case there are mistakes.

MR. BLACKBURN: Could we do that, please? I'm sorry, Your Honor. It's not the --

THE COURT: It's no problem.

MR. BLACKBURN: -- greatest way to start the day.

THE COURT: Well, you all paid for this Xerox machine anyway. Might as well use it.

Did you give him the little script about, you know, starting with the December, and then he can use that and mark them, and we can sit quietly. What do you think?

MR. BLACKBURN: Sounds good, Your Honor. I have the script right here.

BY MR. BLACKBURN:

Q. Mr. Stehn, did I put in front of you a copy of your 2008-2009 report?

A. Yes, I have it here.

Q. Okay. And if you would turn to Page 25 of that, that is at least one script. That was the one I was reading from.

A. Right. And I have a, I have a separate second copy of that same list --

Q. Well --

A. -- I think marked P --

Q. Well, I think the idea is -- this is Table 11, at least from your 2008-2009 winter report, and then I guess it's been reproduced in another format. Is that correct?

A. That's correct.

Q. Would you just double check to make sure every, all the information is the same on both? And then what I'm going to ask you to do, when the map comes back, is just take us through each one and mark them for us, please.

A. Now, do you want it marked where the --

THE COURT: Where they disappeared from or where you found the carcass.

THE WITNESS: Okay. Okay.

BY MR. BLACKBURN:

Q. And in some cases, they disappeared from one area and were found in another place?
A. In another.
Q. So that may be two marks for one bird. So --
THE COURT: Found dead in another place?
MR. BLACKBURN: Yes, Your Honor. I believe that's true with at least one bird, maybe two. Certainly they've -- one of the ones over by Dunham Bay, I think, was --
THE WITNESS: Right. It would be easiest if I know where it died or where I last saw it, that would be the easiest to mark.
MR. BLACKBURN: And you can just mark it by where you last saw it?
THE WITNESS: Right.
MR. BLACKBURN: I think as long as we all under --
THE COURT: Let's do this. Blue for adults, pink for chicks, orange for subadults. And then in, within that category, where you found the carcass or pile of feathers, just put a pen, mark an X --
MR. BLACKBURN: Do you have a --
THE COURT: -- on top of the orange or the pink or the blue.
THE WITNESS: Okay.
THE COURT: Does that make sense?
MR. FERNANDES: If I could make a suggestion, we

probably ought to call them juveniles. That's my understanding when they get to Aransas they're juveniles.

THE COURT: Subadults are juveniles?

MR. BLACKBURN: No, no. Juveniles, subadults and adults.

THE COURT: Juveniles.

MR. FERNANDES: Chicks would be up in Wood Buffalo.

THE COURT: I don't know, I thought we were doing a lot about chicks here.

MR. FERNANDES: Yes.

THE COURT: All right. Juveniles are pink, orange are subadults, blue are adults. And if you actually found a carcass, you put the color and an X over it in black. How's that?

MR. BLACKBURN: Do you have a pen, Mr. Stehn?

THE WITNESS: Yes.

THE COURT: Would you give him a map?

MR. BLACKBURN: This is the map for you to mark on.

THE COURT: Give a couple to the Defendants, please, so they can recreate the same exhibit. I'll Xerox the new exhibit, too, but -- okay. You can proceed.

THE WITNESS: And I'll need to start, I think, at the very beginning of the list, even though I --

THE COURT: December.

THE WITNESS: -- did some yesterday?

THE COURT: Yeah, because that's gone.

THE WITNESS: Correct. Very good.

THE COURT: Would you like different colors, or are you satisfied with those colors?

THE WITNESS: I'm happy.

THE COURT: Thank you.

MR. BLACKBURN: And Your Honor, if I understand, Mr. Stehn's just going to start talking and writing?

THE COURT: He's just going to start writing.

MR. BLACKBURN: Just writing. Good. Okay.

(PAUSE.)

THE COURT: You want him to put a number beside each one also, first one, second one?

MR. BLACKBURN: I think --

THE COURT: Mr. Fernandes?

MR. FERNANDES: Yes, Your Honor.

MR. BLACKBURN: I think that would be great.

THE WITNESS: Okay.

THE COURT: Now, we're all agreed?

THE WITNESS: So the first, obviously, the first one, December 1st, would be 1.

THE COURT: Right, please.

THE WITNESS: Is that -- okay.

MR. BLACKBURN: I think we will be able to follow that if --

(PAUSE.)

(Court and Clerk conferring off the record.)

THE COURT: We're just trying to decide how to reproduce these, because it turns out orange Xeroxes black. The other highlighters come out fine. But we can put it on the ELMO and print out some copies. It's too late.

(PAUSE.)

THE COURT: Do you need another one?

THE WITNESS: No, I'm okay so far.

THE COURT: Okay.

(PAUSE.)

THE COURT: You can go watch if you want.

MR. BLACKBURN: No, I think --

THE COURT: I can tell you're getting anxious.

THE WITNESS: Almost done.

MR. BLACKBURN: It's okay. It's just not often I stand up here --

THE COURT: You can sit.

MR. BLACKBURN: I might take you up on that. Thank you.

THE COURT: You can. Feel better?

MR. BLACKBURN: Much better.

THE COURT: Good.

(PAUSE.)

THE COURT: This will come out from y'all's lunch

hour. Is that all right?

(PAUSE.)

THE WITNESS: All right. I believe I'm done.

THE COURT: Thank you.

MR. BLACKBURN: Let's see. Do you want me to approach, Your Honor, and then we'll show it on the ELMO and then have it --

THE COURT: Right. And then we'll get it printed out for everybody. If there's no objection to the offer. Thank you, Mr. Stehn.

BY MR. BLACKBURN:

Q. Okay. Now -- what exhibit are we on?

(Counsel conferring off the record.)

MR. BLACKBURN: Should I write directly on this Plaintiff's Exhibit 377, Your Honor?

THE COURT: Yeah, do it in the, looks like the lower left-hand corner or maybe upper right, or something like that.

MR. BLACKBURN: Upper right.

MR. MUNDY: Jim, on the bottom right is our exhibit number, just mark through that.

BY MR. BLACKBURN:

Q. Mr. Stehn, I think you've been playing artist here for a bit.

THE COURT: I was just thinking, first I give him a subpoena, next I give him an assignment.

BY MR. BLACKBURN:

Q. Is this your work product from what, the task the Judge and I have asked you to do?

A. Yes, it is.

Q. And this is marked as Plaintiff's Exhibit 377, and is this a, to the best of your ability, an accurate depiction of the types of, the classification of the crane mortalities and the location of the territories, as well as perhaps where they were found, the carcasses were found? And we'll go through and talk about that.

A. Yes, it's -- it is.

Q. And on this map, how did -- and I guess I'll move for introduction of Exhibit 377.

MR. FERNANDES: No objection, Your Honor.

THE COURT: 377 is admitted. Can you start printing that off now?

THE CLERK: Yes, Your Honor.

THE COURT: Is it in a good place? Do you want to straighten it out a little?

MR. BLACKBURN: I can straighten it out a little bit, I think.

THE COURT: You want to blow it up just a little bit and see if we can get a little bit better definition on an exhibit?

MR. BLACKBURN: Oh, I just lost --

THE COURT: Okay, that's fine. Thank you.

MR. BLACKBURN: Do you want me to wait until everybody gets copies before we go forward?

THE COURT: No, but I just don't want you moving it.

MR. BLACKBURN: I'm sorry?

THE COURT: We'll start -- just don't start, just don't move it. I'll start printing it now.

MR. BLACKBURN: That will be good. I will not touch it.

THE COURT: Thank you. Go ahead. I think we're going to print out a couple more.

MR. BLACKBURN: Can we, may we talk while the printing is going on?

THE COURT: No, go right ahead.

MR. BLACKBURN: Okay. Sorry, Your Honor.

BY MR. BLACKBURN:

Q. Now, Mr. Crane -- Mr. Crane. Mr. Stehn, would you describe what is meant by the different colors that are on Exhibit 377?

A. Yes. We can classify whooping cranes into three age categories. Those are juveniles, which have brown plumage their first winter, basically for the first 12 months of their lives. The other color, the orange on that exhibit are subadults, which are nonbreeding whooping cranes, ages one to three or one to four. And the blue colors are adults which are

paired up breeding adults which are age three to four and to old age.

Q. And have you put on this map circles and Xs?

A. Yes, I have.

Q. And have you double-numbered any individual mortality?

A. I don't know what you mean by "double-numbered."

Q. In other words, did you mark both the territory and the location, or did you --

A. No. I -- if I knew the location where the carcass was found, I put that as an X. And I did not put the territory.

Q. So the Xs depict where the carcass was found. And if you could identify a territory associated with that bird, you did not mark the map for that territory.

A. That is correct.

Q. Now, I would like you, if we can, to, to just go back down the list and identify, starting at one, each of these different mortalities. We talked about many of these yesterday, and I certainly will ask you to spend no time on those, other than to identify those, starting with December 1st, two-year-old male.

A. Right. That's the X at number one in the center, middle center portion.

Q. Let's see. We have --

A. I have a pointer.

Q. Yeah, could you take the pointer and just --

A. Right there.

Q. Okay.
A. And that was a live bird that we found that was unable to stand or fly, and we picked it up and took it to the vet, and it died en route to the vet. That was classified on that map as a subadult. We know more exactly the age, I believe, because it had some, a few remaining brown coverts, which meant it was like a year-and-a-half of age.
Q. Okay. December 29th, South Sundown Island.
A. Number 2, that was a, a known family group that I've known for years, been following them, and on that December 29th flight, the juvenile was missing.
Q. January 8th, unknown, which we also talked about being sort of Anonymous Number 1, John Doe. That would be January 8th, Unknown Number 1?
A. Correct. That is Number --
Q. 3?
A. -- 3, which is right there. That is the approximate area where that, what I'm calling an unknown family stayed in.
Q. And that was unknown to you because you didn't have it formally marked as a territory. It was a new group for you?
A. That is correct. They, I did not notice that that pair had a territory the previous year, and they seemed to roam around a little bit more than a territorial pair would, which probably indicates this may have been their first chick that they, or first juvenile, excuse me, that they brought to

Aransas.

Q. January 8th, West Shell, juvenile missing on Matagorda Island. That would be Number 4?

A. That's correct. Right there.

Q. Okay. And January 11th, Mustang Slough, juvenile, Number 5?

A. That's up here, and this, in this case, this is the territory from where that juvenile spent the winter. I made a mistake here and I should have marked where it was last seen, which is actually up off the refuge, up here.

MR. BLACKBURN: Do you want to make any notation of that, Your Honor, or --

THE COURT: I think we'll just consider it testimony, because I've already admitted the exhibit. I don't know if we need to change it. Mr. Fernandes, what's your thought on that?

MR. FERNANDES: Whatever the Court's preference is is fine with us.

THE COURT: You all tell me.

(Counsel conferring off the record.)

THE WITNESS: I really don't have an exact --

THE COURT: What number was that one?

THE WITNESS: That was Number 5. I don't have an exact location of where it was last sighted.

BY MR. BLACKBURN:

Q. Just for the record, could we say it's up near the word

"Winter" in the title?

A. Yes, that would be good.

THE COURT: How is that?

MR. BLACKBURN: It's good with me.

MR. FERNANDES: That's fine, Your Honor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. Number 6, juvenile carcass found by Dunham Bay.

A. Right, this was the bird that its winter territory was over here. I believe that's Number 40 -- Territory Number 47, but it was actually found over here on the edge of Dunham Peninsula. And I should have an X -- yeah, there is, that's the X right there.

Q. There's an X, yes.

A. Correct.

Q. Now, let me just ask you, there's a double asterisk on both the Mustang Slough juvenile and the juvenile carcass from Dunham Bay. And the notation at the bottom says, "Separated from its parents prior to mortality event." Now, is that, is that unique, in your experience, for this type of separation to occur?

A. It's very unusual. I have seen it before in the same scenario, where a juvenile, when it separates from its parents, invariably disappears, and I declare it as dead, because it, it just -- I mean, my personal opinion is it's an indication, that

separation is an indication that it's sick in some way, because a healthy, normal juvenile is underneath mom or pop begging for food all winter long. And you know, normally you see the juvenile within, you know, 10 meters of one of the adults, you know, trailing very close behind. So for a juvenile to be separated, something very strange is going on.

Q. And is that why you put the asterisks by those?

A. That is correct.

Q. And January 29th, the West Brundrick juvenile, Matagorda Island, that would be Number, what, 7?

A. 7.

Q. Right up there?

A. That is right there.

Q. And Number 8, the East Welder juvenile?

A. Over here.

Q. Number 9, one adult missing on Panther Point uplands?

A. Right. This is an upland location. The salt marshes is more where my pointer is now, and they were on the uplands.

Q. January 29th, Number 10, one adult missing south of Power Lake.

A. That is right here on Matagorda Island.

Q. Now, on January 29th, you've identified four cranes basically missing and became presumed dead after a period of time, I presume. Is that correct?

A. Well, the date I have there is the date when I discovered

them missing.
Q. For the first time?
A. For the first time, right. I normally would wait until my next flight or even a third flight to officially declare them dead. I don't, I don't like declaring them dead and then having to change my mind. That's not good.
Q. But the date that you're recording is the date when they first were detected as missing?
A. That is correct. So on the January 29th, I detected four mortalities.
Q. Had you ever previously detected four mortalities on a single flight?
A. Not that I remember, no, sir.
Q. So over virtually thirty years?
A. That's correct.
Q. February 11th, I presume that's the date of another flight?
A. Yes, sir.
Q. Solitary juvenile, this would be Number 11, from unknown family, end of San Jose Island.
A. Right. This is the one on the very edge of the map, on the south portion of the craning range on San Jose Island. It was at a dugout all by itself.
Q. And it's also got the asterisk mark next to it?
A. Right. And in that particular case, I am not sure which

territory that juvenile came from. I can speculate that it was the unknown family group on San Jose, but I was never positive.

Q. Number 12, Panther Point juvenile missing, February 11th?

A. That should be here.

Q. 13, February 11, pipeline pair juvenile missing.

A. Right here on the middle of the refuge.

Q. February 11th, South Sundown Bay juvenile missing.

A. South Sundown Bay --

Q. Number 14.

A. 14, right. There it is.

Q. Oh, that's a 4. Okay.

A. That's 1-4, yes.

Q. February 11th, one adult missing from one plus one group at feeder by Cedar Bayou.

A. This was right here, Number 15.

Q. Number 16, February 11th, south Panther Point juvenile missing.

A. Just here on Matagorda, south of Panther Point, which is right there.

Q. Number 17, February 13th, North Dunham Bay juvenile found in mouth of alligator.

A. This is Number 17 here at a dugout in the middle of what we call the north point pasture on the refuge, and there, that juvenile came from this Territory Number 20.

Q. Now, without being facetious, what do you do when you find

a carcass in the mouth of an alligator?
A. The -- actually, it was two staff members that were doing fish surveys that were down at that dugout. They picked up a wing of the bird that was on the bank and looked out and saw the alligator with the carcass in its mouth that they were pretty sure was a whooping crane. And they, at the end of the day, came back to me at the office, asked if I was busy, and I said, "No, what you got?" And they said, "Well, we want you to identify something," and they handed me the wing of a juvenile whooping crane. It was very, very obvious. They knew it, too. They were just being --
Q. Being careful?
A. -- professional, yeah.
Q. Number 18, North Brundrick juvenile missing on Matagorda Island?
A. That would be here.
Q. February 23rd, Number 19, lethargic subadult missing in North Dunham Bay area.
A. 19, did you say, sir?
Q. Yes, sir.
A. There, right there.
Q. There it is.
A. And that was reported by the whooping crane tour boat, so I don't have an exact location, but I know they and I have communicated on what we mean by North Dunham Bay, so it's in

that vicinity.
Q. Number 20, old pile of white plumage feathers found at upper pump canal.
A. That is right here in the middle of the refuge.
Q. 21, March 15th, airport juvenile missing on Matagorda Island?
A. This is the airport territory on Matagorda Island. It's right next to the old Wynne Ranch that has an airstrip next to it.
Q. 22, Rattlesnake Island juvenile limping badly, then disappeared.
A. This is the Rattlesnake Island territory where it was last seen.
Q. And then Number 23, April 1st, one plus one grouping west of airstrip on Matagorda Island. Confirmed April 7th.
A. 23, that looks like a 23 right there, yes, sir.
Q. Now, in the history of your 30 years at the refuge, had you ever experienced a winter like 2008-2009?
A. Well, this, this was the worst on record. There was a -- previously the worst winter that I recall was 1990, when we lost, I believe it was 11 whooping cranes.
Q. Now, during the course of the winter of 2008-2009, did you come to understand that this was going to be a little bit different winter than a normal winter? How early did you detect that?

A. Well, I would say by January 8th. This was our -- on January the 8th, I detected the third and the fourth mortalities of the winter, which puts it, you know, kind of approaching that threshold where, where I would consider it to be approaching a high mortality winter. And at that point, the food supply was not good. There were low numbers of crabs, and the wolfberry crop had not been good. And from my experience, that kind of screams out that trouble is brewing for the whooping crane flock, for them to survive the winter.

So at that point, I even, we started talking with my boss, manager Dan Alonzo about possibly supplemental feeding the population.

Q. And did you undertake supplemental feeding that year?

A. Yes, we did.

Q. When did the supplemental feeding begin? Do you recall?

A. It's in this report in front of me. I think it was towards the end of January, best I can recall.

Q. And we've seen photographs that were taken from the feeders. How many feeders did you put out?

A. I believe thirteen. I believe it was six on the refuge and seven on Matagorda Island.

THE COURT: How many did you say?

THE WITNESS: Thirteen total.

THE COURT: What do you put in them? What kind of food?

THE WITNESS: We put whole kernel corn, and you buy that basically from feed storms -- feed stores. It's the same thing that a lot of South Texas landowners feed their wildlife to attract deer and feral hogs and birds. Corn is a, corn is a well, a favored food of the whooping cranes in migration. They normally leave Aransas, and they will feed extensively on corn in the migration, which is really one of the miracles of the species, that they can eat seafood all winter long, and then boom, you know, day one of the migration, they might be in a corn field.

THE COURT: Become vegetarians.

THE WITNESS: It's pretty amazing.

MR. BLACKBURN: The --

THE COURT: So I guess the question would be, could they eat corn year round and be all right?

THE WITNESS: The vets tell me that they wouldn't be all right. It would be like you and I eating potatoes all year long. You need, you need a variety of foods to get your minerals and protein and things like that. The corn is a great carbohydrate, but the cranes would not get the calcium and the, all those nutrients to build up the fat levels that they need for nesting.

THE COURT: So it wouldn't be a satisfactory diet?

THE WITNESS: What would be?

THE COURT: I said it wouldn't be satisfactory to eat

corn year round for these birds.

THE WITNESS: Correct, right.

THE COURT: Okay.

THE WITNESS: But our experience with the feeders, and there are some feeders right now on private lands, our experience is that the cranes will utilize the corn at the feeders, but they're also spending lots of time out in the salt marsh. So they're getting whatever else is available. So they're really getting a balanced diet, and it's my opinion that the corn can be a very important supplemental feed to make sure they have the calories that they need to make it through the winter.

BY MR. BLACKBURN:

Q. But even with the corn being provided, cranes continued to perish?

A. Yes. The -- it had been years and years and years since Aransas Refuge had fed corn to whooping cranes. And it took them, I would say, several weeks, even as long as three weeks to kind of discover the feeders. And we put the feeders out first on Aransas, and then I believe there was a week or so delay before we got them out on Matagorda Island. So it was really February sometime by the time that we estimated 20 percent of the flock took advantage of using those feeders. Of course, there were not, we did not put out feeders on private lands on San Jose Island or Welder Flats.

Q. Now, at some point in this winter season, you called Dr. Felipe Chavez-Ramirez, or contacted him in some way.
A. Yes. I -- honestly, I, I really don't remember the details of that. I was very, very concerned. I mean, I was seeing a horrible picture of habitat for the whooping cranes that winter, and I was extremely alarmed by it. I do not have the experience out in the field assessing habitat that Felipe Chavez-Ramirez does. So I, I'm sure I contacted him and sort of pleaded with him to, you know, could he make a trip down, we're kind of in a crisis situation here. And he responded and down he came. There was no contract or anything like that that I remember. He just came. I mean, he's interested -- he's always been interested in whooping cranes, ever since I've known him.
Q. So you think highly of his credentials and knowledge and things like that?
A. Yes, I do. He's the best source of knowledge about whooping crane foods in Aransas and how the cranes interact with their habitat.
Q. So you say there was horrible habitat conditions. What do you mean by that? What was horrible?
A. Basically, the wolfberry crop was less than average. Notably less than average. Normally wolfberries just cover the marsh in the fall, and to the point of I had never really tried to document how many there were. The wolfberries are just

everywhere, and the whooping cranes are seen walking from bush to bush. They'll strip six or eight wolfberries off a bush. They'll walk, you know, three, four, eight, ten steps to the next bush and grab some more wolfberries.

This year, in that '09, '08-'09 winter, that just wasn't the case. There were not that many wolfberries compared to normal.

Q. What about crabs?

A. Crabs were, I believe they were okay in November, but what happens is when the cranes get here, and whooping cranes are arriving starting in mid October normally, and by Thanksgiving over half -- no, not Thanksgiving, I'm sorry, by the first week, by the end of the first week in November, more than half the flock is usually here. And they are chowing down on as many as 80 blue crabs a day per individual crane. And they basically eat out the supply of blue crabs that is awaiting them in the fall when they get here.

And so that is what we observed, that by -- and I'd have to look, again look at my report, but by December, blue crabs were extremely scarce. And we noticed the whooping cranes were not feeding on blue crabs.

What happens is the blue crab level gets so low that it's not energetically, it makes no sense energetically for a whooping crane to keep searching for crabs. And they have to go to other areas to look for food.

Q. There's been a lot of testimony, a lot of cross-examination so far, whether it be testimony, that crabs, I mean, that cranes can eat anything, that they're omnivorous, and that there are a lot of things out there and they'll just simply go from one thing to another. What's your experience with that?

A. Well, that is true, they are omnivorous and they will not, they will not end up with an empty stomach. They're going to find something to put in their stomach. The problem is that these other foods that they get, such as insects, it's a lot harder to fill up your stomach trying to catch grasshoppers in upland areas, compared to catching large size blue crabs that you can, that are very, very high in fat content.

So it's my opinion that whooping cranes really struggle when they don't have their primary abundant food sources of wolfberry and blue crab.

Q. And just to be clear, on the map up here on 377, it appears that the mortality is distributed more or less across the winter range. Is that more -- is that true?

A. Yes. I think that's quite notable. The one interesting thing -- and I don't -- I doubt there's any statistical significance or anything, but on the Lamar Peninsula, there was no documented mortality.

Now, on the Lamar Peninsula, there are a series of feeders with the corn on private lands. I would say, oh, six,

six or eight feeders perhaps. And the cranes will regularly -- all the cranes on Lamar pretty much regularly visit those feeders, as well as feed a significant period of time in the marshes.

Q. Now, in terms of other potential causes of mortality, was there an oil spill? Was there a barge collision? Was there anything like that that might explain the disruption of the habitat, death of the cranes?

A. No, nothing, nothing like that that I know of. An oil spill, you would not expect an even distribution of mortality. If a person went out with a grudge against whooping cranes and started shooting them, you would not expect an even distribution. I mean, some of those missing birds would be extremely difficult to get to those areas.

So whatever it was, it was affecting the entire flock, or at least the entire flock except, you know, with a question mark about Lamar.

Q. Now --

A. But you have to remember, there were -- there are a lot fewer whooping cranes on Lamar. There's up to about 20, I believe, that wintered there. So you know, you're comparing 20 whooping cranes on Lamar versus 70 on the refuge. So again, I think hard to conclude anything about the Lamar.

Q. There has been some mention that the fact that the wind blows the water out of the marsh, that that's the reason that

the, that there was such mortality. Do you subscribe to that at all?

A. No. The wind blows the water out of the marsh every winter, and it, probably initially it, for lots of birds, it actually traps water in small ponds and bayous and can actually increase feeding opportunities initially. But then yes, it would, it becomes a tougher time for cranes during these low, mid winter low tide periods. But this happens every winter.

And from my experience, in the, in the 2000s, we are getting nothing like the low tides that I saw back in the, back in the '80s, when we had significant hard winter freezes in Texas, and I saw entire bay systems, like Dunham Bay and Mustang Lake that were just huge mud flats. I have seen nothing like that in the last dozen years or so. So there was nothing like that in the '08-'09 winter that hadn't been occurring every winter.

Q. Now, you're a member of the Recovery Team. I guess you were the leader of it for several years, I guess, of the American contingent or United States contingent?

A. Correct, for 14 years.

Q. For 14 years. At the Recovery Team, did you take a position with regard to fresh water inflows and their role with regard to the wintering whooping crane population?

A. I would -- yes. I would have to refresh my memory by reading the section in the 2007 whooping crane, International

Whooping Crane Recovery Plan, which we rewrote and we -- it became a joint Canadian-U.S. plan and revised in 2007. And I believe there's several paragraphs in there about inflows.

Q. And when you say it became a joint Canadian-U.S. plan, I mean, it's basically both governments coming together and adopting this plan?

A. That is correct.

Q. And have you ever seen the U.S. Fish and Wildlife Service Spotlight Species Action Plan for the whooping crane?

A. I, I basically wrote the draft of it, yes.

MR. BLACKBURN: May I have Plaintiff's Exhibit 25?

THE WITNESS: It's very interesting to note, on the international implications of this species, and it points out the importance of joint management, is years and years ago, there was a film created about all the issues and disturbance at Aransas that the whooping cranes face compared to this, compared to a absolute wilderness, untouched national park up in Wood Buffalo National Park, where there's no access, basically no humans are allowed in the crane area. Overflights are highly, highly regulated. Come down here to Aransas, and you see the tour boat and the movie with the loud speaker blaring and tourists snapping pictures. And fisher, you know, we allow fishing and hunting and all kind of activities down here, which is very different from Canada. And Canada, you know, at these meetings will say, you know, "Come on U.S., get,

you know, come on. You know, the species is hurting, and you know, a lot of those issues are down here, down on the wintering grounds."

THE COURT: Could that have any bearing on the mortality rate? Of the wintering here?

THE WITNESS: Sure. It's -- yeah. Yeah, disturbance obviously energetically stresses the cranes a little bit.

BY MR. BLACKBURN:

Q. Do you think it's a major cause?

A. I don't think it's a major cause, no. No. I think the cranes have, have kind of adapted to human presence in the most cases.

Q. And with regard to this Species Action Plan, I'd like to zoom in on Paragraph A, please. Under A Number 2, "At Aransas National Wildlife Refuge and throughout the central Texas Coast, decreases in fresh water inflows from water diversions and reservoir construction add to the following threats."

Now, this is included in a document called a Spotlight Species Action Plan. I think you said you helped write a draft of that. What is this document?

A. The Fish and Wildlife Service several years ago were trying to direct, target funding towards the most important species, so they called them Spotlight Species. And this was an attempt to kind of publicize as a planning document, these are critical needs for the Fish and Wildlife Service.

Unfortunately, no additional funding has materialized to help with this plan that was written. No funding to carry it out. And that's the same thing with the Recovery Plan. You write a Recovery Plan, and you list 100 items that are needed to help the species, and there's no funding for that.

Q. So funding is an issue?

A. Yes, it is.

Q. Now, under A, or under 2, it talks about "Decreases in fresh water inflows from water diversions and reservoir construction add to the following threats." And you say, "Reduction in available main food items at Aransas, the blue crab and wolfberry." Is it fair to say you believe those two food items are related to fresh water inflows?

A. Yes, I do. The -- in the case of wolf, wolfberry, the recent research that was done to specifically, that specifically addressed that was the SAGES report worked by Rachel Buxler (phonetic) and Dr. Steve Davis, and they found that with increasing salinities, soil salinities in this case, that the wolfberry crop declined.

Q. And then --

A. So that directly the increased, or I'm sorry, decreased fresh water inflows would lead to fewer wolfberries for the whooping cranes.

Q. And with regard to blue crab?

A. Well, blue crab is tricky. And I'm not a blue crab

expert. What I've tried to, tried to learn is the -- you often go to Texas Parks and Wildlife documents and data, and I believe what I call a very significant work, I believe it was Longley in 1994, but I could be wrong on that reference, but he basically stated that salinities of between 5 and 15 parts per thousand were kind of optimal, in the bays now, they were kind of optimal salinities for blue crabs.

Now, it's real tricky, because there are times in the life cycle of the blue crab that they need high salinities. They need to go out in the Gulf of Mexico for the, for the females to spawn and the young to survive, those young larval stages. But when they get back in the bays, it seems like this 5 to 15 salinity range is optimal.

And that's also an optimal range of 5 to 15 parts per thousand so that the whooping cranes can drink directly from the marsh. When you start getting 15 -- and my data this last winter showed, the figure I came up with was 18 parts per thousand. That's when we start seeing whooping cranes having to fly to fresh water dugouts, and that's one of the, that's one of the clues that I see in the movements of the whooping cranes, that kind of tells me that the stress levels are rising, that it may be a tough winter for the whooping cranes.

Q. Now, there have been some suggestion by some experts in this proceeding that whooping cranes don't drink water.

A. They absolutely, definitely drink water, whenever those

salinities rise, in my experience, above 18 parts per thousand. It's a little tough to come up with that exact number, because when we're measuring salinities in the marsh, we're measuring a few distinct points. And we're not covering entire transects across the marsh. So when I measure 18 parts per thousand, you know, other parts of the marsh might be 15 or 16. It can vary by a couple of parts per thousand, so --

THE COURT: But you're looking at that, say there's a family that resides in the territory of the 18, that's the family you're seeing go to fresh water? If you're testing in an area --

THE WITNESS: Right, correct.

THE COURT: You said these cranes are territorial?

THE WITNESS: Absolutely. That's correct.

THE COURT: And --

THE WITNESS: It's a little tricky, because the territory ranges, each territory, in most cases, on the refuge, for example, ranges all the way from the bay all the way up to the uplands. So in that area of a mile, you might have a little bit of a salinity gradient. So I'm usually measuring the salinity nearest the uplands, just because it's the easiest to get to.

THE COURT: Okay.

THE WITNESS: And I'm not walking all the way across the territory checking the bay salinity. So in that case,

there may be cases where ponds in the territory get hyper-saline, and that's very common. Right now, we've got ponds 40 to 50 parts per thousand. They're cut off. We're in a drought. They're just getting saltier and saltier. But the cranes may, in some winters, the bay waters may be fresh enough that they would make that flight or walk down to the bay to drink when they needed to.

Now, currently, bay salinities are sky high, so the whoopers absolutely have to go to fresh water.

BY MR. BLACKBURN:

Q. Now, this is the --

THE COURT: Which of the Defendant experts are going to tell me that the whooping cranes don't drink water?

MR. BLACKBURN: I think Dr. Slack had something like that in his --

THE COURT: Okay.

MR. BLACKBURN: -- expert report.

THE WITNESS: I have a postcard at home with a photo of the whooping crane drinking and the water dripping down the bill. It's a very distinctive head up motion, where they let gravity bring the water down the throat.

THE COURT: A scooping thing.

THE WITNESS: Scooping, yes. It's just very, very apparent.

MR. FERNANDES: For clarity, Dr. Slack was

testifying -- he doesn't say that the cranes don't drink water. What he says is they don't need to fly to fresh water when salinities reach 15 to 23 parts per thousand in the salt marshes, and there's no science to support that.

THE COURT: Got it.

BY MR. BLACKBURN:

Q. Did you hear that?

A. I missed the last half of sentence there.

Q. I think what he said was I sort of misstated what Dr. Slack might be saying.

A. Right.

Q. Dr. Slack says that there's, if I understand, no evidence that when the water gets between 15 and 23 parts per thousand, that the cranes have to go to fresh water, rather than drink in the marsh.

MR. BLACKBURN: Is that a fair characterization?

MR. FERNANDES: There's no study that's ever established any science to support the proposition, is what he testifies to.

THE WITNESS: I have -- I mean, I knew this was such a key issue this past winter, I focused on that issue, and I have data that in my observations, when those threshold, when the salinities reached 18 parts per thousand, cranes were absolutely going to water holes in substantial numbers.

THE COURT: So that's your study.

THE WITNESS: That's my study.
THE COURT: And you're sticking by it.
THE WITNESS: Yes, ma'am. Unpublished, unpeer-reviewed. It's just observations.
BY MR. BLACKBURN:
Q. But over the years, have you seen the cranes going to these dugouts to drink fresh water?
A. Absolutely.
Q. I mean, now, there's been some talk that when they fly to these ponds, they're actually coming there to feed.
A. You can see the drinking motion. It's very obvious. A lot of those dugouts are too deep for whooping cranes for them to get out and forage. There's also alligators in that dugout. So they are right on the edge of the dugout. They scoop their water, and they're not, they're not wading in the water. It's probably dangerous for them. So they're getting that drink --
THE COURT: I think Dr. Chavez-Ramirez testified yesterday, I think you were here when he was testifying, that when they have, when the cranes have to go to the fresh water areas --
THE WITNESS: Right.
THE COURT: -- the predator, the predation levels increase. Is that right?
THE WITNESS: Right.
THE COURT: Is that the right word? Predation? I

don't know, predators.

MR. BLACKBURN: Yeah, you know, the risk for predators.

THE WITNESS: The risk, right. We don't know if the actual predation rate increases, but there's certainly more risk --

THE COURT: A higher risk.

THE WITNESS: -- at the dugouts, right.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. So just in terms of the safety of the cranes, I take it it would be better for the cranes not to have to fly out of the marsh to the fresh water ponds. Would that be a fair statement?

A. That is correct. It gets a little difficult in a -- say you have a shallow flooded area on an uplands. Say there's been a rainstorm and you've got two inches of water in a small area half the size of this courtroom. The whooping cranes in that instance may be drinking as well as foraging. Okay? So it just depends.

Q. But that's after a rain and after, you know, in an area. It's not the normal pattern when they come to the dugouts.

A. No, not at a dugout.

Q. Okay.

A. And you see that because they drink, and normally they,

they drink and within five or ten minutes, they are walking back out of the dugout back to the high ground where they have better visibility. And the refuge specifically tries to keep the brush away from these dugouts, so that there aren't predator threats around those dugouts. And when you do a prescribed burn, that includes a dugout, then the cranes will go out on that burn and feed, forage, you know, maybe 15, 20 minutes of foraging, and there's also socializing, and you may have different crane groups interacting as they're coming to the fresh water, and one may chase another a little bit. There's kind of a, I don't know, a little bit of a social interaction connected with the use of the fresh water.

Q. Now, this document, this Species Action Plan, is it an official document of the United States Fish and Wildlife Service?

A. Yes, sir, it is.

Q. And if they can turn to the last page, not that one, the last page. There. Do you recognize the signature on this?

A. It looks like Allen Strand, who's the head of the Ecological Services Office in Corpus Christi.

Q. And did you work with Mr. Strand in the preparation of this, did you say?

A. No, I worked with his, his staff, primarily his assistant, Dawn Whitehead.

Q. And have you been out looking at the marsh and the bay

system this year?
A. This winter?
Q. This winter.
A. Only one day. I went out on the whooping crane tour boat, I believe it was last, a week ago Saturday.
Q. Did you lead the tour?
A. No. I love being incognito on those tours.
Q. I bet that's right.
MR. BLACKBURN: Could you excuse me one minute, Your Honor?
THE COURT: Yes, sir.
(Counsel conferring off the record.)
BY MR. BLACKBURN:
Q. Mr. Stehn, I certainly appreciate your indulgence in this process. And I thank you, both for being here, and for your years of service. Thank you.
A. Thank you.
THE COURT: Are you going to be able to stand being away?
THE WITNESS: Yes, ma'am. I love retirement.
THE COURT: Really?
THE WITNESS: I'm really looking forward to this afternoon.
THE COURT: Did you go --
THE WITNESS: I was, I mean, I really knew I would

miss it, and worried about that. And as it turned out, retirement --

THE COURT: You're fine?

THE WITNESS: -- just fits me like a glove.

THE COURT: Isn't that nice?

THE WITNESS: It's the lack of responsibility. You know, that's what -- you know, it's like well, whatever happens now is, there's supposed to be other people working on it, not me.

THE COURT: Well, we showed you, didn't we?

THE WITNESS: Yeah.

MR. FERNANDES: Your Honor, before I get started, may I approach the witness and give him some hard copies to hopefully --

THE COURT: Thank you.

MR. FERNANDES: -- facilitate the examination? And I am trainable. I don't talk as I'm going back and forth any more.

THE COURT: Thank you.

CROSS-EXAMINATION

BY MR. FERNANDES:

Q. Good morning, sir.

A. Good morning.

Q. Let's look at your individual surveys that you performed during the winter of 2008-2009. But before we do that, let's

look at Exhibit 6, please.

MR. BLACKBURN: Is this Defendant's Exhibit 6?

MR. FERNANDES: I'm sorry, Defendant's Exhibit 6.

BY MR. FERNANDES:

Q. Now, you recognize Defendant's Exhibit 6, do you not?

A. Yes, I do.

Q. And to facilitate things, to the extent that we put an exhibit up on the screen and you want to look at the full body of that document, those documents are in front of you. Are you with me?

A. This one document, yes, Exhibit Number 6.

Q. Yes. But all the documents I'm going to be showing you, to the extent that you want to look at a hard copy, you'll have one with you.

A. All right.

Q. Now, isn't that your report, 2008-2009 report from the winter, isn't that your winter report?

A. That is my winter report, yes, sir.

Q. Let's go to Page 5. In this report, you say, "When all the cranes were present, a thorough census effort took seven hours." Do you see that?

A. Yes, sir.

Q. Is that a true statement?

A. It depends on the speed of the aircraft. Because the, we've switched to a faster airplane. We're in a Cessna 210

now. The pilot has an hour of taxi time to come pick me up. He comes from Castroville, Texas, and he has an hour to get back home. And the FAA regs are that you can only fly eight hours in a day. So that gives us six hours flight time. So we crank up the speed, and we have to get the census done now in six hours.

Q. Okay.

A. We're covering the same area that, that in a previous, previously took seven hours in a Cessna 185.

Q. And so does it take then six hours to cover the full territory?

A. Yes, it takes all of six hours.

Q. Now, let's look at the first sentence on this paragraph. And do you see there, it says, "12 flights were made between November 14th and June 30th, with a total air time of 60.4 hours"?

THE COURT: Is this the '08-'09?

MR. FERNANDES: Yes, this is '08-'09, yes.

THE COURT: I just wanted to make sure that I'm --

MR. FERNANDES: Yes.

THE COURT: -- on the right area.

MR. FERNANDES: Yes.

BY MR. FERNANDES:

Q. Do you see where it says, "60.4 hours over the crane area"? Do you see that?

A. Yes, I do.
Q. Now, if my math is correct, wasn't your average time per flight during the winter of '08-'09 5.03 hours?
A. I would need a calculator to confirm that.
Q. Well, we know that 12 divided by 60 is roughly five. Correct?
THE COURT: 60 divided by 12.
MR. FERNANDES: Thank you.
THE COURT: Okay.
THE WITNESS: That's correct. And the explanation on that is that on the flights when the entire whooping crane population is not here, say, for example, if I'm doing a flight at the end of April, when most of the whooping cranes are gone, then I do not take a full six hours for that census flight. I widen the transects. I hit the highlights. I'm not looking at every nook and cranny of the marsh where I expect whooping cranes, because my experience is, when the cranes are first arriving or when they're leaving, they're not in these out of the way places. There are no other whooping cranes acting territorially, and so they can go to the prime, best spots. And you can normally, when you're looking for, say, the last six whooping cranes that are in Aransas, you can basically cover San Jose Island with three or four transects, compared to, you know, in the, in the full, when you're doing a full census, it would take, you know, multiple times to cover it

all.
Q. Now, let's look at your individual surveys. Didn't you testify yesterday, and I think I heard this right, that you try to count every crane on these surveys?
A. If I'm, if my objective is to determine the peak population, yes, that's correct.
Q. Okay. Let's look at your first survey, the November 14th, 2008 survey, Defendant's Exhibit 127, please. Does Defendant's Exhibit 127 appear to you to be a true and correct copy of your November 14th, 2008, survey?
A. I can't read that, sir.
Q. Okay. Could you pull it up? And you have, I'm sorry, you have a screen in front of you.
A. Oh, I'm sorry. Okay, that looks like my census report.
Q. Okay. Now, didn't you estimate -- I'm sorry -- on your first census, didn't you count 239 cranes?
A. That is, that is the number of cranes I actually saw that day.
Q. And didn't you estimate that there would be 246 cranes in Aransas by noon on November 15th of 2008?
A. I believe that's correct.
Q. If you only actually observed 239 cranes, how is it that you were able to estimate that by noon on November 15th, there would be 246 cranes in Aransas?
A. Because I get reports from staff, I get reports from

landowners, and they tell me as whooping cranes arrive. And so --

THE COURT: That's the biology link on the --

THE WITNESS: Yeah. In that case, it's more local. They're just local landowners or refuge staff. And the refuge staff will say, "Well, I was out on Matagorda Island, and I saw a family group on," say, "Power Lake." And then the day before, I didn't have any family groups anywhere near, say, Power Lake. I'm just making up an example here. Then, so then I could add a family group in. And that's where I'm adding in seven cranes, I believe, the following day.

BY MR. FERNANDES:

Q. Now, this first aerial census that was done during the winter of '08-'09, the flight time was five hours, was it not?

A. Where do you see that? Oh, there it is. Okay. "Weather conditions were ideal during the five-hour flight with sunshine and light winds." I don't know if that's five hours exactly or five, maybe it was just a rounding off. I don't know. I have that in a folder at the refuge.

Q. Let's go to your second aerial survey, the November 25th, 2008 survey.

MR. FERNANDES: Can you pull this up so we can see it?

BY MR. FERNANDES:

Q. Does Defendant's Exhibit 128 appear to you to be a true

and correct copy of your November 25th, 2008, survey?
A. Yes, it does.
Q. And didn't you count 266 cranes on this flight?
A. That is -- that is what, the number of cranes I actually saw that day, yes.
Q. And did you estimate the flock size at 275?
A. No, sir. I believe -- I believe it's 270 ended up to be the total flock size. I -- well, let me read.
Q. Let's open it up. Could you pull the, open it up all the way where we have the highlighting, please. If you look at the bottom, it says, does it not, "This brings the unofficial estimated flock size to a record 275"?
A. Correct.
Q. And then it looks like later you went back and reduced it from 275 to 270?
A. That is correct. As I pointed out earlier in my testimony, each flight builds on the previous flight, as the pattern develops. So in this case, I backed off, and I felt I had a duplication on my previous estimate of 275.
Q. Let's see what you say under the paragraph that's entitled Explanation of Numbers Located and Additional Cranes in the Flock. First sentence, "Due to considerable" --
A. I'm not -- can you tell me where you're reading, sir?
Q. Sure. See the paragraph --
THE COURT: Have you got a pointer?

MR. FERNANDES: I don't. Is it here? I don't.
THE COURT: Is it a paragraph underneath the sketch, the drawing?
MR. FERNANDES: Do you see right here --
THE COURT: There you go.
BY MR. FERNANDES:
Q. There we go.
A. Are you saying the sentence where it's "Due to considerable crane movements"? Is that what you're --
Q. Yes, if we can start with that paragraph. Do you see there where it says, "Due to considerable crane movements during the flight, it was difficult to pin down the exact number of whooping cranes present"? Do you see that?
A. Yes, sir, I do.
Q. And then it goes on, the third sentence, "Such movements make it possible to double count cranes, as well as completely miss cranes as they move to and from the marshes"?
A. That is correct.
Q. And then the last sentence says, "Cranes' presence on uplands also makes it very difficult to identify specific territorial cranes, since they are not in their marsh territories." Do you see that?
A. Yes.
Q. Let's talk about, a little about those concepts. You know, we talk about the territorial nature of the cranes, but

wasn't there a lot of crane movement during the course of this November 25th aerial survey, and the cranes were moving to and from the marshes to the uplands?

A. And vice versa.

Q. And as a result of those movements, wasn't it possible to double count some cranes and completely miss others?

A. Yes, sir, that's correct.

Q. And then on the last sentence on this paragraph, "Crane presence on the uplands makes it difficult to identify specific territorial cranes, since they are not in the marshes." Let's explore that concept.

When the cranes are in their salt marshes, they generally stay together, don't they, with the adults and the juvenile?

A. The family -- yes, a one specific family group is together, yes.

Q. But when they go to the uplands, aren't the families observed from time to time associating with other subadults, other pairs and other juveniles?

A. From time to time. Most of the time they, they probably are by themselves, as a unique family group. Now, even when they're associated with other cranes on the uplands, you can usually look at the spacing, and you can also look at the behaviors, and you can say, "Oh, yeah, that's a family group, and it just kind of pushed off four subadults that are 50 yards away." So you get, you get some clues.

Q. In any event, when the cranes are in the uplands, it makes it difficult, does it not, to identify specific territorial cranes?
A. That is correct. The -- to determine territories, you have to observe the cranes within the salt marsh territories. We do not think of the uplands as part of that territory, because they, the whooping cranes do not defend those uplands against other whooping cranes. As you pointed out, they can be loose associations on those uplands.
Q. And so when they're in the uplands, when the cranes are in the uplands, it's difficult, is it not, to identify specific territorial cranes?
A. Yes, sir, it is.
Q. Let's look at your next aerial survey, dated November -- I'm sorry -- December 5th, 2008. Does exhibit, Defendant's Exhibit 129 appear to you to be a true and correct copy of your December 5th, 2008 aerial survey?
A. Yes. I'm looking at the top half of it, and that top half sure does.
Q. And wasn't this an eight-hour flight?
A. That's correct.
Q. And even though it was only an eight-hour flight, weren't you only able to Count 229 cranes on this flight?
A. That is correct. I'm pondering the eight-hour flight business.

Q. If you look --
A. Yeah, I see it.
Q. I'm sorry.
A. I see it. That's what I wrote.
Q. Now, didn't you estimate the flock size at 270?
A. That is correct.
Q. Let's look at your next aerial survey, Defendant's Exhibit 130, which is your December 29th, 2008 survey. Could you pull that up, please? And on this survey, it looks like there's an e-mail and a survey is attached to that e-mail. Is that e-mail on the top a true and correct copy of an e-mail that appears that you sent to yourself on January 2nd of 2009?
A. Let me read it here.
(PAUSE.)
A. Could you please scroll down to see --
Q. You want --
MR. FERNANDES: Could you go down?
THE WITNESS: I want to see the census flight, to see if that's --
MR. FERNANDES: Pull up the whole document.
BY MR. FERNANDES:
Q. There you go.
A. I'm just not recalling this document. But yes, it looks, it looks like I wrote it.
Q. Okay. Let's go back and look at that e-mail that's above

it. Do you see on this e-mail, it's addressed to Brian and Martha. Who is Brian?

A. Brian Johns is the Canadian, was -- he's retired now. He was the, at the time the Canadian Whooping Crane Coordinator, so my counterpart in Canada.

Q. And who is Martha?

A. Martha Tacha is a U.S. Fish and Wildlife Service biologist in Grand Island, Nebraska, and she actually heads up this sighting network of tracking the cranes in migration, as long as -- and she also works extensively on Platte River issues.

Q. Did you send this e-mail to Brian and Martha?

A. Well, there's nothing, nothing in this exhibit that says I did, but it certainly implies I did.

Q. Well, the first sentence says, does it not, "This report is meant simply as a writeup of my field notes. Martha, please do not distribute it." Correct?

A. Right. But I could have written myself a note and then never sent it on to Martha and Brian. And I don't remember so far. Maybe you can show me something else.

Q. Well, if you look at the third paragraph, first sentence, it says, does it not, "The flock estimate is very chaotic this year. I have no faith in its accuracy"? Do you see that?

A. Yes.

Q. And the flock estimate that you're making reference to is your flock estimate of 270. Correct?

A. Would you, would you refresh, what was the date on when I said 270?
Q. The prior aerial survey.
A. So that was December 29th?
Q. Prior to December 29th, we had the Defendant's Exhibit 129, which was your December 5th, 2008, survey.
THE COURT: And that was the eight-hour one?
MR. FERNANDES: That was the eight-hour one.
THE WITNESS: Give me the date on that again.
MR. FERNANDES: Sure. Let's just go back and show Mr. Stehn Defendant's Exhibit 129. And could you pull that up -- no, no. This is Defendant's Exhibit 129.
THE WITNESS: Right. Okay. "Therefore, the current estimated flock size is 270." And that was on December 5th.
BY MR. FERNANDES:
Q. So now let's go back and look at your, Defendant's Exhibit 130, which is the December 29th, 2008 aerial survey.
A. I'm sorry, you're kind of --
Q. That's why, if it's easier for you, I have Exhibit 130 in a folder.
A. I guess you're just kind of talking fast, so --
Q. Okay.
A. I'll slow you down. I'll --
Q. All right.
A. -- insist on understanding before I answer.

Q. If, for whatever reason, I'm going a little too fast, just tell me.
A. Okay.
Q. And I'll slow it down.
A. It's not your -- I'm just struggling. But --
Q. All right. All right. Let me slow it down. Let's go back to Defendant's Exhibit 130, which is this, begins with the e-mail January 2nd, 2009 e-mail, and then attached is the December 29th census report. And let's focus on the third paragraph in the e-mail --
THE COURT: Would it be easier for you to lay those out in front of you?
THE WITNESS: I think it would, yeah.
THE COURT: You've got them in the hard copies.
MR. FERNANDES: I do.
THE COURT: 179 --
MR. FERNANDES: And so that's going to be, we're on Exhibit 130.
THE COURT: Okay. Are you starting with 179?
MR. FERNANDES: Yes.
THE COURT: Actually, we started with 127.
MR. FERNANDES: 127, yeah.
THE COURT: 127 was the first flight.
MR. FERNANDES: I have them all in chronological order.

THE WITNESS: Okay. Let me do some housekeeping here.

THE COURT: You want to help him?

MR. FERNANDES: Yeah. Could we take about a five-minute break?

THE COURT: A break? Okay. I forget always. Thank you. Fifteen minutes.

(Recess from 10:01 a.m. to 10:18 a.m.)

THE COURT: Thank you. You may be seated. Is Mr. Stehn back? There he is. Go ahead. Anything to take up? Are we all right?

MR. FERNANDES: We're ready to go. May we proceed, Your Honor?

THE COURT: Yes, sir.

BY MR. FERNANDES:

Q. Go to Defendant's Exhibit 130. Are you ready, Mr. Stehn?

A. Yes, I am. Thank you.

Q. Okay. Let's go back to Defendant's Exhibit 130. This statement in the third paragraph of Defendant's Exhibit 130, "The flock estimate is very chaotic this year. I have no faith in its accuracy. Were you referring to the flock estimate of 270?

A. January 2nd -- yes, that is correct.

Q. Let's go to the, is it on Page 2, Highlighted Sightings? Let's go to Page 2. Do you see here on Page 2, it says,

"Numerous crane movements to the upland areas and water holes presumably accounted for cranes being overlooked?" Do you see that?

A. Yes, I do.

Q. So on this December 29th, 2008 flight, were cranes overlooked by virtue of numerous crane movements to the uplands?

A. That is what I estimated, yes. Obviously, if I overlooked them, you can't say for sure, you know, why you missed them.

Q. Okay. Let's look at that paragraph on the bottom. No, before we go there, on the flock estimate, do you see this heading, "Flock Estimate"?

A. Yes, sir.

Q. And do you see there, the last sentence, "Previous flights indicating 40 juveniles were present presumably included some duplication as family groups moved around." Do you see that?

A. Yes, I do.

Q. So was there duplication in your juvenile count on prior flights?

A. No. What that is referring to was I had -- if I remember correctly, I had, on previous flights, I had two additional family groups on Welder Flats. And when I did this subsequent flights prior to this January 2nd memo, I was thinking that -- on previous flights, I was adding in those two additional family groups. Then I realized that, that I couldn't do that.

Those family groups on Welder Flats earlier in the winter had moved over to another part of the winter range. So it wasn't like on the same day I double-counted them. I was -- it was one of those distributional things where I was speculating and adding in additional cranes, thinking that on subsequent flights I would find those additional birds. And then when I did future flights, I realized what had happened. And therefore, I could not add in those birds.

Q. Let's look at the paragraph, "Sightings Near Aransas." Do you see there, beginning with the second sentence, where it says, "On today's flight, one adult and one chick were closely associated in a former fish impoundment on the Bauer property south of Austwell, Austwell, along FM 774. This is presumably the juvenile split off from its parents just before reaching Aransas associated with one subadult." Do you see that?

A. Yes, I do.

Q. From time to time don't the juveniles split off from their parents and associate with subadults?

A. This is a very different situation. I explained that earlier, that in migration, it is known that juveniles sometimes get separated from their parents. And my best estimate on this particular juvenile was it had gotten separated from its parents in migration.

Q. So it's --

A. And the association with a subadult -- and that was

because I had seen it as a single out in the farm fields. Now, on this particular reference, it was with another crane.

Q. So is it your testimony here today then that you haven't previously observed juveniles at the refuge separating from their adults, from their parents, and associating with subadults? Let me go at that again.

A. I think --

Q. Let me rephrase the question, because I'm not so sure I understand it. Okay?

In prior years, have you seen a juvenile separate from their parents and associate with subadults?

A. Yes, I have. And that's always right before the spring migration, or during the spring migration, where a pair leaves and leaves the juvenile behind. The juvenile decides not to go. And so then he starts associating with subadults.

There's a few other very unusual cases where, if there's a re-pairing during the winter, say a whooping crane takes a new mate, and the whooping -- the original whooping crane had a juvenile, okay, so say you've got a mother and a child out there. Along comes a new mate for the mother. The new dad may try to force the juvenile out of the territory and may succeed.

So in a few, very few instances I have seen a juvenile separated from its parents at Aransas. Now, when that happens, I normally pick up that juvenile on these weekly whooping crane flights. And I kind of know, oh, yeah, it came from here, and

it's -- and it usually hangs around. It's usually within a mile or two of its parents.

Q. Let's go to Defendant's Exhibit 131, the January 8th, 2009, fifth aerial survey.

A. Okay, okay, slower on that again.

Q. Sure. Defendant's Exhibit 131.

A. I'm sorry, it's my fault for not listening as much as you're --

Q. No, no, as I said --

A. I gotcha.

Q. Are you with me?

A. Yes, sir.

Q. All right. Let's look at your -- is this a true and correct copy of your January 8th, 2009, aerial survey?

A. Yes, it is.

Q. Now, on this aerial survey, it says you've tallied 267 cranes. Do you see that? If you look at the screen, it might -- or you can look at the screen in front of you.

A. And repeat the question, please.

Q. Sure. If you look at the paragraph under "Whooping Crane Numbers," it says, "We tally 267 cranes." Do you see that?

A. Right. But that doesn't mean I sighted 267 cranes that day.

Q. No, that's my next question.

A. Okay.

Q. My next question is, didn't you only count 234 cranes on that flight?
A. Um, two --
Q. And so you know where I'm going, I'm taking --
A. Yes, that's correct. Yes. And --
Q. Because what you did is you actually counted 234 cranes, and then you added to that tally the 33 cranes that were wintering in a part, on San Jose Island. Correct?
A. Yes. And I presume that's because I did not fly San Jose Island that day.
Q. Oh, you're staying ahead of me now. That was my next question.
THE COURT: You added in, you added in how many extras that day? You saw 234.
THE WITNESS: Right. And I added in 33. And the reason for that is presumably the week before -- I guess it would depend on the -- well, it could be there I flew a portion of San Jose and missed a portion. And then I go back to the previous week. The numbers generally stay pretty steady. If I go out one week and have 30, say I have 33 birds on San Jose, the next week, I'll go out and there might be 30, there might be 35, there might be 36. A lot of times there's 33 again. It doesn't jump, it doesn't jump by huge amounts. It jumps maybe by a little bit, or it stays the same. So when you're doing an estimate, it was reasonable in my mind to say I could add in

those 33.
BY MR. FERNANDES:
Q. And let me see if I can refresh your recollection with regard to whether or not you actually flew over San Jose Island during this January 8th, 2009, aerial survey. Do you see here where it says, "With every crane sighted on the flight, plus 33 cranes known to be wintering in a part of San Jose Island, San Jose Island, not flown" --
A. There you go.
Q. -- "we tally 267." Do you see that?
A. Yes.
Q. Does that refresh your recollection that in connection with this January 8th, 2009, aerial survey, you didn't fly over the wintering grounds on San Jose Island?
A. Yes. Can I point out to you the fifth sentence in that report, sir?
Q. Certainly.
A. It says, "A complete census was not conducted due to smoke from a prescribed burn on San Jose Island and limitations on allowable flight time." So we were unable to fly over that portion of San Jose Island because of smoke. And then apparently I did not have enough allowable flight time to go back later in the day and cover that area.
Q. And you raised a good point. When Fish and Wildlife Service does these prescribed burns, doesn't that induce the

cranes to fly to those uplands?
A. Yes. But normally there's -- it's not instantaneous. They may take, you know, four to eight hours to respond. And this particular fire was on private lands.
Q. And wasn't more prescribed burns done during the winter of 2008-2009 than in the past 20 years?
A. Wow, I --
Q. Well, let me ask the question this way. When you perceived there to be a food shortage during 2008-2009, didn't the Fish and Wildlife Service increase the number of prescribed burns?
A. I would, I would have to look in my report here on the acreage. Do you know the number of, the total acreage that we burned that it's in my '08-'09 report?
Q. Maybe it's better to go at it this way. Whatever figure is represented in your reports with respect to the acreage burned on any given year, would that be, would those numbers be accurate? Let me --
A. Yes, with a caveat that some, sometimes a burn is done sort of on the edge of the crane range, and it's a little difficult to, to -- you know, it might be an area where you really don't expect the cranes to respond, because it's a little too far away from where they normally go. And now I don't remember if I included some of those burns in those figures or not. Sometimes I was just saying during the winter,

the Fish and Wildlife burned X number of acres. I don't, I don't want to -- I'd have to go through each fire to say, you know, was it specifically done for whooping cranes.

Q. But in any event, those, don't those prescribed burns induce crane movement?

A. Yes, very much so. And they're done to provide additional habitat and additional foraging acres for whooping cranes. And I believe you're correct, that that winter we tried to do our full complement of burns and maybe even an extra burn to try to help the population.

Q. Let's look at Paragraph 4 here, under Habitat Use. Do you see here where it says, "With food shortages continuing in the salt marsh, crane use of uplands as well as a notable shift to open bay habitat has cranes staying off their territories. This makes it very difficult to determine the identity of pairs and family groups and leads to much uncertainty." Do you see that?

A. Yes, I do.

Q. And was that a true statement in connection with describing your January 8, 2009, aerial survey?

A. That is correct.

Q. Let's look at your sixth aerial survey, Defendant's Exhibit 132. Are you with me?

A. Yes.

Q. Does Defendant's Exhibit 132 appear to you to be a true

and correct copy of your January 29th, 2009, sixth aerial survey?

A. Yes, but I would like to comment that --

THE COURT: What number?

THE WITNESS: -- there are handwritten -- excuse me?

THE COURT: What number is this?

MR. FERNANDES: This is Defendant's Exhibit 132.

THE WITNESS: I would just like to comment that those handwritten notes on there are written usually, are written for sure after the census report is sent out. So it could reflect things I've learned subsequent to the flight.

BY MR. FERNANDES:

Q. And that is your handwriting that appears on Defendant's Exhibit 132, is it not?

A. Yes.

Q. Now, didn't you count 262 cranes on this flight?

A. That's correct.

Q. And did you --

A. That's the number of cranes I saw.

Q. And then didn't you at some point in time go back and revise that number from 262 to 260? If you look at your handwriting, see, it says, "Probably, due to miscount."

A. Right, "Probably 260."

Q. In fact, could you read your handwriting that appears over here, please?

A. It says, with a line pointing to the 262 tally, it says, "Probably 260, due to miscount on Lamar."
Q. Now, let's look at the second page. Let's look at what you say under Habitat Use. "Tides were extremely low the week of January 22nd. Much of the marsh on San Jose Island consisted of dry mud flats. Food sources for whooping cranes continue to be very low this winter, primarily due to the summer drought, with food shortage continuing in the salt marsh. Crane use of uplands as well as notable shift to open bay habitat has cranes staying off their territories. This makes it very difficult to determine the identity of pairs and family groups and leads to much uncertainty during the census count." Do you see that?
A. Yes, I do.
Q. And let's back up and talk about some of these concepts. Weren't the tides extremely low the week of January 22nd?
A. Yes, they were.
Q. And because the tides were low, didn't much of the marsh on San Jose Island consist of dry mud flats?
A. That is correct.
Q. And when tides are low, doesn't that affect blue crab abundance in the salt marsh?
A. Yes, it does.
Q. And then you go on to say, "Food sources for the whooping cranes continue to be very low this winter, primarily due to

the summer drought." What did you mean by that?
A. Um, exactly what it says, that the summer drought played a major role in the shortage of food sources, which in this -- which I'm presumably referring to wolfberry and blue crab.
Q. And that was my next question. When you say there was a shortage, a food shortage -- a shortage of food sources, are you referring solely to blue crabs and wolfberries?
A. Well, those are the only variables that I'm really monitoring, except for acorns. So the question was: Are those the only things I'm referring to in regards to food shortage?
Q. Yes. Earlier in connection with your testimony, you were talking about what you perceived to be harsh conditions in the habitat. And so I'm trying to get a feel for which food, which food items you believe were scarce during the winter of 2008-2009.
A. Well, the only three food sources I'm monitoring are the wolfberry, the blue crab and the acorns. So it would be those three that I'm aiming that sentence at.
Q. Did you believe that water diversions and salinities had any impact on the availability of acorns during the winter of 2008-2009?
A. No. No effect.
Q. Let's go on and look at the last sentence of that paragraph. Leave it there, please. When it says, "This makes it very difficult to determine the identity of pairs and family

groups and leads to much uncertainty during the census count," is what's going on here when those tides go down the blue crabs are not as available in those salt marshes, are they?

A. Well, yes. And I think -- we don't have good data on that. What we have is, we're kind of presuming that some of those crabs go out in the marshes -- go out in the open bays, I'm sorry. They go out in the open bays. So yes, there are not as many blue crabs in the marshes available for the whooping cranes. And especially there's no mechanism with the low tides for more blue crabs to re-enter the marshes.

Q. So when those tides go down and the blue crabs go out into the bays, don't the cranes then begin to forage in the uplands and in other areas?

A. They may. But it also could be, in an abundant blue crab year, they will go through these dried up ponds and pick blue crabs out of the substrate. And the tidal situation I'm referring to there happens every winter. San Jose Island dries up and becomes large, most of it large mud flats every winter. And that's why I perceive a, probably a difference in habitat quality perhaps on San Jose versus the refuge.

Q. In fact, you've described the various food items over the course of an average winter before, have you not?

A. Repeat that, please.

Q. Sure.

A. I'm not listening. It's my fault.

Q. Didn't you provide comments to the SAGES report?
A. Yes, I did.
Q. And in those comments, did you describe the crane diet in the average winter?
A. I talked a lot about blue crabs and wolfberries, if that's what you're referring to.
MR. FERNANDES: Your Honor, may I refresh -- may I approach the witness? Because I can't put this up on the screen. I just want to refresh his recollection.
THE COURT: Sure.
THE WITNESS: Is it that whole first paragraph you're referring to?
BY MR. FERNANDES:
Q. Well, we can start --
A. Start there?
Q. What I'm, what I gave it to you for is if you can read --
MR. BLACKBURN: Your Honor --
MR. FERNANDES: -- that first paragraph and see if you can refresh your recollection.
THE COURT: Yes?
MR. BLACKBURN: Excuse me. This is not an exhibit that's in evidence, and I think it should be.
MR. FERNANDES: It's hearsay. I'm just trying to refresh his recollection on this one point.
THE COURT: Well, is it his hearsay? What are you

talking about?

MR. BLACKBURN: It's his comments to SAGES report.

THE COURT: It's his comments to what?

MR. BLACKBURN: What's called the SAGES report. It was a set of comments written by Mr. Stehn that are not in evidence at this time.

MR. FERNANDES: Because -- it's on neither witness list because we objected on hearsay, and it's not in evidence. All I'm doing --

THE COURT: And now you're using it?

MR. BLACKBURN: Yes, ma'am.

MR. FERNANDES: I'm just, I'm just refreshing his recollection.

THE COURT: What do you want, what number do you want to offer it as?

MR. FERNANDES: What number are we on?

MR. TAYLOR: 394 is the next --

THE COURT: Defendant's 394?

MR. FERNANDES: Let's just put it up on the screen then.

THE COURT: Sorry, Defendant's 394? Is it Defendant's 394?

MR. FERNANDES: Yes. I'm sorry, Your Honor.

THE COURT: Thank you. Admitted.

MR. FERNANDES: Let's go to, let's put up TAP 4867.

Just put up the first paragraph, please.
BY MR. FERNANDES:
Q. If you can look at that first paragraph on Page 3 -- first of all, is this a true and correct copy of your comments to the SAGES final report?
A. Yes, it is.
Q. Okay. If you look at Page 3, TAP 46 -- 4867, do you see on the top, it begins, "In an average winter, blue crabs and wolfberries are readily available when the cranes return to Aransas in the fall." Do you see that?
A. Yes, I'm following.
Q. Is that a true statement of what you've observed?
A. Yes, that is true.
Q. Then it goes on to say, "High tides in late September, early October, have inundated the marshes and allowed the crabs to disburse into connected and unconnected ponds." Is that --
A. That's --
Q. -- a true and correct statement of what you've observed?
A. That's correct. Usually connected with the fall equinox.
Q. Then the next thing that happens is, "Starting in October, wolfberries are flowering and fruiting into December." Is that consistent with what you have observed in most winters?
A. Yes, it is.
Q. And then it says, some, "Usually sometime in December, the cranes have consumed many of the blue crabs in the marshes and

the wolfberry crop is well past its peak and over by the end of the year." Is that also consistent with what you've observed?
A. Yes, it is, with the caveat that a very, very few wolfberries may be flowering and may be a berry at any time, but very, very few.
Q. Then it goes on to say, "Starting in late November, low pressure systems that reach the coast lower temperatures and bring north winds that blow the bay waters out into the gulf." Do you see that?
A. Yes, I do.
Q. Is that also consistent with what you've observed?
A. That is correct.
Q. And then it goes on to say, "Tides are lowered dramatically." Do you see that?
A. Yes, sir.
Q. Is that consistent with what you've observed?
A. Yes, it is.
Q. And when those tides are lowered dramatically, do the blue crabs then tend to move from the marshes into the open bays as the marsh and water levels and temperatures drop?
A. That, that is an assumption. I have no empirical evidence of that, but it seems logical to me that that's what happens, to some extent. Some of the blue crabs, instead of moving out into the open bays, burrow down into the substrate.
Q. And so that's consistent with what you've observed, is it

not?
A. Yes, except I've never observed blue crabs moving back out into the bays.
Q. Okay. Because in other words, when those tides drop, aren't some blue crabs fortunate enough to ride the tide, so to speak, back into the bay?
A. I have -- I haven't ever observed that.
Q. Well, okay.
A. I mean, it makes sense.
Q. In any event, when those --
A. I kind of laugh at your, your thinking that's more fortunate. Who knows if it's more fortunate or not for the crab.
Q. All right. And then, it says, "Many crabs seek out deeper water, which tends to be warmer than the shallow marsh waters." Do you see that?
A. Yes.
Q. Then what happens, doesn't it say, "Whooping crane food habits shift dramatically to foraging in open bay habitat for clams and invertebrates in the substrate." Do you see that?
A. Yes.
Q. So is what generally happens in the winter, when the tides go down and the blue crabs are not abundant, that the cranes' diet shift dramatically to foraging in open bay habitat for clams and invertebrates?

A. Yes, in years when blue crabs are not abundant. Now, in years when blue crabs are very abundant, they would still be available in these very shallow or what we're calling mud flats. And the cranes could, in a good blue crab year, still feed on blue crabs.

Q. But in any event, based on your observations, haven't you observed at least two things affecting blue crab abundance? One, tides; correct?

A. Correct.

Q. Secondly, temperature.

A. Well, it's well-known that blue crabs become dormant at a given low temperature. I don't remember what that is. So yes, that's correct.

Q. Let's go on to your seventh aerial survey, Defendant's Exhibit 133.

MR. FERNANDES: Could you put up Defendant's Exhibit 6, please. I'm sorry. Let's go back to -- I'm sorry, let's go back to Defendant's Exhibit 132, which is the 1/29/2009 aerial survey. We didn't look at the second page.

THE COURT: Can I ask a question? In that survey that we just read, that's kind of your, a history of what happens.

THE WITNESS: Right.

THE COURT: Is that right? And always apparently every cycle two things affect the blue crab every year, and

that's low tides and low temperature.

THE WITNESS: Yes, yes. I mean, there could be others. I mean --

THE COURT: Right. But I mean, those are the ones that are all the way through that you know of.

THE WITNESS: Yeah. This is a very consistent pattern of --

THE COURT: So when you add high salinity to that in a drought year, does that make a difference?

THE WITNESS: Yes, because it's my feeling that there aren't as many blue crabs to start with.

THE COURT: Well, is that a feeling or something you've observed?

THE WITNESS: I've observed it.

THE COURT: Okay.

THE WITNESS: I've observed it. This exhibit that was just introduced, I went through 20 years of my observations, and I tried to relate -- I divided those 20 years into what I considered high Aransas mortality winters versus low mortality winters for the cranes. And during all of those high mortality winters, and there were 7 of them in those 20 years, I found reduced blue crab numbers and very high salinities. So there seems to be --

THE COURT: How many years did you say were high mortality rates?

THE WITNESS: I believe it was 7 of the 20. And I think my mortality rate was defined as greater than 1.5 percent of the flock. So I see a strong correlation between the blue crabs and the salinities. And when they're not -- when the blue crabs are scarce and when salinity is high, I expect and have found consistently that the food supply is reduced for the whooping crane.

And I was also extremely disappointed that SAGES totally ignored those observations. They never explained why I was seeing that correlation, in my opinion, in their document.

BY MR. FERNANDES:

Q. Haven't you reported a number of years of high salinity with low or no mortality?

A. I'd have to, I'd have to look at my table.

Q. Would your tables basically accurately reflect what you observed?

A. Yes.

Q. Now, let's go to Page 2, items of interest at the bottom.

A. Exhibit 132?

Q. Yes. We're still on Exhibit --

A. Okay.

Q. -- 132. We're on the second page of Exhibit 132. Do you see there where it says, "A group of four adults was sighted in the interior of the Lamar Peninsula southwest of the Johnson Ranch in a location I have never flown over before"?

A. Yes.
Q. "The group presumably was visiting a game feeder in the front of a residence. They were difficult to spot from the air, due to big trees." Do you see that?
A. Yes, sir.
Q. And is that a true statement of what happened during the course of your January 29th, 2009 survey?
THE COURT: Don't --
THE WITNESS: Yes.
THE COURT: Don't touch the microphone.
THE WITNESS: Okay. Sorry. Trying to clear the papers.
THE COURT: You need her to fix it? Ms. Gano? Okay.
THE WITNESS: Sorry. Yes, that's the correct date. This area on Lamar is about a quarter mile from places where I routinely census. And I had gotten reports from landowners that whooping cranes were coming into their front yards basically. So I added that area to my census flight, and it's now become a regular part of census flights.
BY MR. FERNANDES:
Q. Don't a number of private landowners have game feeders out there that the cranes eat at?
A. That's correct.
Q. And isn't that what you're referring to over here?
A. Yes, that's correct.

Q. And so this crane that you're identifying on Exhibit 132 is a crane that was located not on the Aransas Refuge. Correct?
A. That's correct.
Q. Okay. And if we can go down to the next --
A. You're talking about the four cranes in that instance.
Q. Yes.
A. Correct?
Q. Yes.
A. Okay.
Q. So this is four cranes that were not at the reference during this survey. Correct?
A. That's correct.
Q. Okay. Let's look at the next paragraph, Sightings Near Aransas. "On today's flight, three adults were in a former fish farm impoundment on the Bauer property south of Austwell, along FM 774. Two cranes were at a game feeder north of Holiday Beach along Highway 35. One whooping crane was confirmed present near Oso Bay in Corpus Christi on January 13th. It was a game feeder and a location where a whooping crane had been present in the fall of 2005." Do you see that?
A. Yes, I do.
Q. Weren't all six of these cranes located in areas outside of the refuge in January of 2009?
A. Okay, I'm not finding the -- I'm not finding it in front

of me. I'll read it on the yellow up there. Today's flight, three -- fish water, fish pond is off the refuge. Game feeder Holiday Beach is off the refuge. Oso Bay is off the refuge. That's a correct statement you made.

Q. So on this January 29th, 2000 (sic), aerial survey, based upon what we've just seen here in the last two paragraphs, haven't you identified ten whooping cranes that were not on the refuge during the course of your January 29th, 2009 survey?

A. Three --

Q. These six and the four that were previously discussed.

A. Yes, and there's also numerous, there's probably a hundred whooping cranes that aren't on the refuge, on San Jose Island and Welder Flats. I'm not following you.

Q. Well, what do you consider to be the crane territories? In other words, you're making a distinction between Aransas Refuge itself, San Jose Island, Lamar Peninsula. What do you call that, the entirety of the area?

A. That's, that's the whooping crane winter range, and I divide it up into those, those classifications of Matagorda and Lamar and the refuge.

Q. Is Oso Bay included in the winter range?

A. No, it is not.

Q. Is a game feeder on Holiday Beach along Highway 35 in the winter range?

A. Yes, it is.

Q. Okay. And is --
A. The fish farm at Bauers pond --
Q. Yeah.
A. -- is also within the winter range. We have numerous, it's not common, but in numerous winters, a few whooping cranes will occasionally go out in the farm fields, and that's something that's monitored.
Q. Is the game feeder along Holiday Beach within the survey area?
A. Yes, it is.
Q. Let's look at --
THE COURT: Is Oso Bay within the survey area?
THE WITNESS: No. No. And that was a phone call I got. And I believe the whooping crane -- the landowner called a expert birder, and by the time the birder, the expert birder got there, the whooping crane was gone. So that was, that was a subadult, presumably a subadult whooping crane that, who knows where it wintered.
BY MR. FERNANDES:
Q. Let's go back to that previous paragraph, under Items of Interest. Didn't you specifically say the four adults that were sighted on this aerial survey --
A. I'm sorry, somebody coughed and I missed that.
THE COURT: Me. Go ahead.
BY MR. FERNANDES:

Q. I'm sorry.
A. I'm sorry.
Q. I'm sorry. Doesn't it specifically say the group of four that you sighted that's referenced under the paragraph Items of Interest were in a location that you had never flown over before?
A. That is correct.
Q. Let's go to your next aerial census, February 11th, 2000 -- February 11th, 2009 census. Does that appear to be a true and correct copy of your February 11th, 2009 census?
MR. BLACKBURN: Excuse me. Is that Defendant's Exhibit 133?
MR. FERNANDES: 133. I'm sorry.
THE WITNESS: Yes, what you're showing, yes, what you're showing on the screen is my census report.
BY MR. FERNANDES:
Q. Didn't you count 229 cranes on this census?
A. That is correct.
Q. And didn't you estimate the current flock size to be 259?
A. That is correct.
Q. Let's go to your next aerial census, Aerial Census Number 8, Defendant's Exhibit 134. Are you with me?
A. Right, eighth census, that's my census flight report.
Q. Okay. Let's go to Page 1. Didn't you count 238 cranes on this census?

A. That's correct.
Q. Didn't you estimate the flock size at 253?
A. That's correct.
Q. Let's turn to Page 2, please.
A. Exhibit 1 -- which?
Q. Exhibit, Defendant's Exhibit 134, Page 2.
A. Oh, I'm sorry.
Q. And in this, under the heading Habitat, don't you say, "Some water is starting to move back in the coastal salt marshes, although much of San Jose Island remained as dry tidal flats"? Do you see that?
A. That is correct.
Q. Then it goes on to say, "Blue crabs are still scarce due to the drought." Correct?
A. That's correct.
Q. Let's look at Defendant's Exhibit 135, the ninth aerial census. Do you have it?
A. Yes, I do.
Q. And does Defendant's Exhibit 135 appear to you to be a true and correct copy of your ninth aerial survey?
A. Yes, it is.
Q. And that's dated, is it not, March 15th of 2009?
A. That's correct.
Q. And didn't you count -- let's turn to TS 241.
A. TS -- I'm lost on that.

Q. When we say "TS," that's what we call Bates numbers. Those are the letters and numbers that appear on the bottom right-hand side of the page.

MR. FERNANDES: And so what page would that be?

MR. TAYLOR: The last page.

THE WITNESS: Oh, I get it.

BY MR. FERNANDES:

Q. It's the last page.

A. Thank you. Okay.

Q. Is that your handwriting?

A. Yes, it is.

Q. Does that reflect that you counted 153 cranes on this flight?

A. I'm looking on the front page on what my tally was. Does it not say on that front page?

Q. I couldn't find it. That's why I'm asking the question.

A. Okay. So now totals observed -- now, that wouldn't be -- no, that's not correct that I observed 153, because that only shows the refuge, Matagorda Island and San Jose, unless I only flew those -- apparently I only flew those particular areas. Let's see, I can't -- let me read my writing. R1, R2, MI, M -- can't read the writing. It's faded. But these are the -- this is referring to the sectional maps that I'm holding on my lap, and I tally up the cranes on each map. So that looks like 153, but I did not fly the entire census area, it looks like, on

that flight.

Q. Just so we have clarity in the record, can you tell from looking at Defendant's Exhibit 135 how many cranes you counted on your March 15th, 2009, aerial survey?

THE WITNESS: I've got to do some math here, Your Honor.

(PAUSE.)

THE WITNESS: 30, 49, 50 -- 58 plus 78, plus 18 -- 4, 5, 7, 8. Okay. Here in my tallies there, it looks like 154. But on the right, I have a 57 plus 96, which is 153. So I'd say 153 or 154. Is that sufficient for your purpose, or do you want me to try to pin it down?

BY MR. FERNANDES:

Q. That's fine.

A. Okay.

Q. Let's go to Page 2. First, let's go back to Page 1. And on this March 15th, 2009, flight, didn't you estimate the flock size to be 249?

A. That's correct.

Q. Let's go to Page 2. Let's go to Paragraph 1 first. Do you see here, it says, "I have been asked how the current poor conditions of the cranes may affect the migration." And later on in the paragraph, you say, "Mortality in migration could increase." Do you see that?

A. That's correct.

Q. Didn't you believe that crane mortality during the migration to Canada following the winter of 2008-2009 could increase because of the condition of the cranes?
A. It could.
Q. Now, if you go on to the habitat use, do you see there where it says, "Crane locations on the flight included seven observed at manmade fresh water sources. Salinities remain high, measured recently at 30 parts per thousand in the refuge boat canal." Do you see that?
A. Yes, I do.
Q. So didn't you only observe seven cranes at a manmade fresh water sources when salinities exceeded 23 parts per thousand?
A. That's correct.
Q. Let's look at your tenth aerial survey, Defendant's Exhibit 136. Let's look under the heading Migration. Did you count 109 cranes on this flight?
A. That is correct.
Q. And as of April 7th, 2009, had the cranes already started their migration?
A. That is correct.
Q. And didn't you estimate the flock size at 247?
THE COURT: The what?
MR. FERNANDES: Didn't you estimate the flock size --
THE COURT: Oh, sorry.
BY MR. FERNANDES:

Q. -- at 247?
A. With estimated -- "The current flock size is estimated at 247." Correct.
Q. So if I'm following this, didn't you arrive at that flock size of 247 for the first time on your March 15th, 2009, flight, the one that we previously looked at? Do you have that in front of you? Take your time. You can go back to 135.
A. I have March --
THE COURT: You're going to have to pay him an extra $50 an hour for this, Mr. Fernandes.
THE WITNESS: I have on March 15th my estimate of the flock size at 249. Now, on April 7th, I'm saying the flock size estimate is 247. So it's dropped by two.
BY MR. FERNANDES:
Q. Let's go back to Defendant's Exhibit 135, which is your March 15th, 2009, aerial survey.
A. What exhibit number, please?
Q. I'm sorry, Exhibit Number -- Defendant's Exhibit 135.
A. Okay.
Q. Let's look at Habitat, the section Habitat Use.
A. Okay.
Q. I guess we already covered this.
A. Right.
Q. Let's move on to Defendant's Exhibit 136, which is the tenth ariel survey.

THE COURT: Are you saying that some of them had already gone north --

MR. FERNANDES: Yes.

THE COURT: -- when he saw 247?

MR. FERNANDES: Yes.

THE COURT: That's the point, isn't it?

MR. FERNANDES: Yes.

THE COURT: Tell us about that.

THE WITNESS: Say that again, please.

THE COURT: Well, he's saying that if you counted 247 on April the 7th, 2009, some had already started their migration.

MR. FERNANDES: Oh, no, no, that's not my point.

THE WITNESS: No, I didn't count 247 --

THE COURT: Oh, that's not what you're saying?

MR. FERNANDES: No, no, no.

THE COURT: Okay.

MR. FERNANDES: I'm sorry, that's not my point.

THE COURT: I misunderstood.

BY MR. FERNANDES:

Q. I'm just trying to figure out, I'm just trying to -- were you still assuming mortalities after the point in time when the migration back to Canada had already begun?

A. That is correct. Right.

Q. Let's go to Defendant's Exhibit 136, and just let me know

when you're ready, sir.
A. I'm ready, sir.
Q. Okay. Does Defendant's Exhibit 136 appear to you to be a true and correct copy of your April 7th, 2009, aerial survey?
A. Yes, it is.
Q. Let's look under the heading Migration.
A. Okay.
Q. Didn't you count 109 cranes on this flight?
A. That's correct.
Q. And didn't you estimate the flock size at 247?
A. That's correct.
Q. Now, let's look at the second page under Habitat Use.
THE COURT: Okay. I'm still confused.
MR. FERNANDES: I'm sorry.
THE COURT: What does it mean that "56 percent has started the migration"?
MR. FERNANDES: That they've already started migrating back to Canada.
THE WITNESS: Right.
THE COURT: But he counted 247.
MR. FERNANDES: No, no.
THE WITNESS: No, I estimated --
MR. FERNANDES: From our understanding --
THE COURT: That's an estimate.
MR. FERNANDES: Yes.

THE WITNESS: Right.

THE COURT: He physically counted 109 or something?

MR. FERNANDES: 109.

THE WITNESS: But I had a missing and dead, declared dead crane on March 31st and another one on April 1st, and that's the drop of the two that you pointed out. But yes, the migration was underway at the time.

BY MR. FERNANDES:

Q. Now, let's look at Defendant's Exhibit 142.

MR. FERNANDES: Is that where we're at? I'm sorry. Are we still on 136? Which survey are we on?

MR. TAYLOR: This is the tenth survey.

MR. FERNANDES: Okay.

BY MR. FERNANDES:

Q. Let's look at Defendant's Exhibit 136.

A. Okay, I've got it.

Q. Didn't you count, and I'm sorry, I thought I checked this one off, I thought I asked you this, so if I have, I apologize.

A. I think you have.

Q. Okay. Then let me move to basically the, let's move to the second page.

A. Okay.

Q. And on the second page, it says, does it not, "For the first time all winter, nearly all of the whooping cranes were found in the salt marsh on today's flight."

A. That's correct.
Q. "The whooping crane locations on the flight included two observed at manmade fresh water sources. Salinities remain high, measured recently at 29 parts per thousand in the refuge boat canal and 39 in the adjacent marsh." Do you see that?
A. That's correct.
Q. Now, didn't you only observe two cranes at the fresh water ponds during this aerial survey, even though salinities were running between 29 to 39 parts per thousand in the salt marsh?
A. Where does it say I observed -- two at fresh water sources, yes. You know, the airplane's over fresh water ponds for less than a minute on each pond. So cranes can be extensively using fresh water dugouts, and yet I may only encounter a low number on the survey. So that, the two -- when I see any cranes at a fresh water dugout, that is significant.
Q. Let's look at Defendant's Exhibit 142, which is your eleventh, and I believe we're at the end, the last aerial survey. Does that appear to you to be a true and correct copy of your April 21st, 2009, eleventh --
A. Yes, it is.
Q. -- aerial survey, census?
A. Yes, it is.
Q. And didn't you Count 21 cranes on this flight?
A. That is correct.
Q. And weren't you still estimating the flock size at 247?

A. Yes, that's correct.
Q. And so when we got to the end of the winter of 2008-2009, isn't this how you got to your flock size of 247, through these eleven aerial surveys?
A. That is correct.
Q. And so we started the --
A. And additional, additional ground observations, such as the bird that died in my arms.
Q. Now, on census flights, aren't you always speculating on what cranes you may have overlooked, based on crane distribution on previous flights?
A. I'm not speculating that, that I'm overlooking cranes. I know when I've overlooked cranes. Yes, I'm very aware on every census flight that, you know, have I overlooked any whooping cranes. That's on my mind. And that's based on the distribution in the known territories.
Q. Let's look at Defendant's Exhibit 173. Is that a true and correct copy of the, your report from May of 1995?
A. This is extremely fat. Why is the -- oh, wait. Wait. I'm looking -- whooping cranes during the 1994 winter, '95 winter. That's my report, yes, it is.
Q. Okay. Let's look at Page 13. We have it on the screen. Let me know when you're ready.
A. I'm ready.
Q. Do you see here where it says, "On census flights, I am

always speculating on what cranes I may have overlooked based on crane distribution on previous flights." Do you see that?

A. Yes.

Q. Let's, now let's go to your year end report, because we've been accused of cherry picking your field notes. So what we want to do is see what you said in your end of the year report. Are you with me?

A. Yes, sir.

Q. Let's go to your 2008-2009 year end report, Defendant's Exhibit 6.

A. I've got it.

Q. And specifically, let's go to Page 21. And what I want to do is I'm going to, we're going to pull up what begins in the last line of Page 21, continuing to Page 22. And I think it's your explanation on how it is that you arrived at your 270 peak count during the winter of '08-'09. Are you with me?

A. Yes, sir.

Q. All right. Do you see here where it says, "Thus I initially thought" -- and it may be easier, the screen in front of you has the same thing that I'm putting up. "Thus I initially thought the flock totaled 276. But since only two family groups utilize Welder Flats for the remainder of the winter, I backed off my estimate of peak flock size. Follow-up flights started detecting mortality, so it was difficult to reconfirm the estimate of 270. We did the best we could. It

is possible that duplication had occurred on the November 25th flight, with possibly only 260 present, despite the 266 actually counted. However, the January 29th flight that sighted 260 supported the higher flock estimate of 270, since on that date two juvenile cranes were not at Aransas, and mortality on January 29th was estimated at seven, which accounted for 260 cranes." Do you see that?

A. Yes, I do.

Q. Now, if I'm following that, wasn't 260 the most cranes that you counted on any single flight?

A. I'd have to go through these 12 flight reports and see what the tally was.

Q. Okay.

A. I don't, I just don't remember that.

Q. But in any event --

A. Unless I say it in that paragraph.

Q. Well, take your time and read that paragraph, because we do want to know how it is that you came up with this 270 peak estimate for the winter of '08-'09.

A. Okay. I, yeah, I -- okay. (Reading.) Okay. Do you see, or can you find right below Table 7 --

Q. Yes.

A. -- on Page 21? "The estimated flock size of 270 was derived from the 266 cranes, including 36 juveniles, observed on the November 25th census flight, added to four birds still

in migration, two white plumage birds in Kansas, one juvenile in Nebraska, and one juvenile in the farm fields just north of Aransas."

Q. Haven't we seen a previous document where you suggested that your 266 count may have been in error and it may have been actually 260?

A. You'd have to point it out to me again. I, you know --

Q. Let's keep going. Let's go back to DX 6, which is your 2008-2009 winter report, and let's go to that first paragraph, where it talks about what you saw in '08-'09.

MR. FERNANDES: Page 7. No, no, before that. The slide before that.

BY MR. FERNANDES:

Q. Page 21. Are you on Page 21?

A. Okay.

Q. There you go, in that paragraph, last paragraph, just pull up the last paragraph, please. This is what your -- this is your end of the year report describing your census for the year 2008-2009, is it not?

A. That is correct.

Q. And don't you say, "Due to considerable crane movements during the November 25th flight, it was difficult to pin down the exact number of whooping cranes present"? Do you see that?

A. That's correct.

Q. If you go to the third paragraph, "Such movements made it

possible to double count cranes."
A. That's correct.
Q. "As well as completely miss cranes."
A. Okay.
Q. And then skip another sentence, "Cranes' presence on uplands also made it very difficult to identify specific territorial cranes" --
A. That's correct.
Q. -- "since they're not in their marsh territories." Correct?
A. That's right.
Q. And isn't that a recap, so to speak, of your censuses during the winter of '08-'09?
A. Yes, it is.
Q. Okay. Now, let's talk about your methodology for presuming missing equals dead. Isn't your methodology of presuming a crane is dead if it is missing from a survey highly dependent on two things; one, that the cranes stay in their territories, and two, that the family units stay together?
A. No, kind of no to both of those.
Q. All right. Well --
A. It's true, partly true on the family groups staying together. Depends on the circumstances.
Q. Didn't we just see one of your notes where you -- I'm sorry. Are you finished? No, no, I'm sorry. Was there

something you wanted to say?
A. I was thinking of the first point on, is it, is it dependent for them to be in their, in the salt marsh? And that is false. They, I can detect mortality on the uplands.
Q. Isn't it more difficult to detect the territorial families when they're outside of their territories, to identify the families?
A. Not necessarily. For example, when they go to prescribed burns, you have this big green wide open expanse for miles and miles and miles, depending on the size of the burn, and the whooping cranes stand out and can be clumped up, and it can be extremely easy to find them.
What you have trouble doing is identifying which, the actual identity of the territorial cranes when they're on the uplands. You don't know if it's, say, the Mustang Lake cranes or the Redfish Slough cranes necessarily. You can try to sort that out. But when you have multiple movements of cranes to uplands, the salt marsh is so empty, there's so many empty territories, you aren't quite sure which, where they came from.
Q. During the winter of '08-'09, didn't you report that numerous crane movements between the marshes and uplands made them very difficult to count?
A. Yes.
Q. During the winter --
A. Made -- meaning, it doesn't necessarily make them harder

to tally or find, but it's harder to determine the peak population size.

Q. During the winter of '08-'09, didn't you report that crane presence on the uplands made it very difficult to identify specific territorial cranes?

A. That's correct.

Q. During the winter of 2008-2009, didn't you report that cranes were observed by others outside of your survey area?

A. That is correct.

Q. And let's talk about whether or not the family unit stayed together during the winter of '08-'09. During the winter of '08-'09, didn't you report a number of juveniles that had separated from their parents?

A. That's correct, I did. I believe it was four, but I --

Q. Now, I may have misheard, but I think I heard your testimony yesterday to be that juveniles that separate from their parents don't survive. Is that your testimony?

A. When it occurs -- with a few exceptions. If it's in the spring migration and the parents have left and they leave the juvenile behind, then the juvenile is separated, but he can survive fine. In the fall migration, a juvenile that separates off from his parents has a very high chance of survival.

But in my experience, I've never seen a — oh, and then I talked about in a case of re-pairing, a juvenile may get pushed out by the new male or the new female, and he'll hang around a

mile or two from those parents. So in those specific instances that I'm aware of, the juvenile can survive.

In the other instances, where the juvenile just for no apparent reason wanders off, my 29 years of experience says the juvenile cannot survive.

Q. From color bandings, haven't you learned that juveniles that separate from their parents can and do survive the entire winter on their own?

A. Again, those are those exceptions that I pointed out of whooping cranes, juveniles in most cases separated from their adults in the migration. They usually hook up with sandhill cranes. They key in on the behavior of the sandhill cranes and they can survive very well.

Q. And wasn't that learned through the use of color banding that was done during that period of time?

A. It was known long before that. I believe we had a separated juvenile, juvenile on Mingo National Wildlife Refuge in Missouri in 1954 or something like that.

Q. Let's go to Defendant's Exhibit 157. Does this appear to be a true and correct copy of an article that you authored called Unusual Movements and Behaviors of Color Banded Whooping Cranes During the Winter?

A. That's correct.

Q. And was one of the purposes of this article for you to describe what you had learned or what was learned through the

use of color banding?
A. That's correct.
Q. And if you look at Page 96 of this article, don't you report that "There are five known instances of juvenile-parent separation occurring during fall migration. Color bands on some of these wandering juveniles allowed them to be identified."
A. That's correct. At least I've seen three so far. There are five? There's four -- yes, correct.
Q. Let's look at Defendant's Exhibit 169. Does that appear to be a true and correct copy of your winter report for the year 1988 to 1989?
A. Do I have that exhibit, sir?
Q. You should.
A. 169?
MR. FERNANDES: Chris, does he have that exhibit? Could you get 169, 170 and 171?
THE WITNESS: That cover page is definitely my report.
BY MR. FERNANDES:
Q. Could we turn to Page 14?
A. And what winter was that again, sir?
Q. That winter was --
THE COURT: '88, '89 through '90?
MR. FERNANDES: Could you go back to the first page

for him, please. Pull that up, please.

THE WITNESS: '88, '89, okay.

THE COURT: '88, '90 -- '89.

MR. FERNANDES: Chris, let me -- I think we'll be okay with --

BY MR. FERNANDES:

Q. Let's go to Page 14. Do you see here where it says, "On January 3rd, b/b-Y" -- that refers to a color band, does it not?

A. That's correct.

Q. -- "and unbanded juvenile were sighted on an aerial census in a group of six in the south point pasture on the refuge." And then later on it talks about, "For the rest of the winter, b/b-Y and chick mostly roam the southern tip of the refuge, almost always associated with subadults." Do you see that?

A. Correct.

Q. So through use of banding, didn't you learn that in January of this winter, a juvenile had separated from its parents and was associated with --

THE COURT: He called it a chick.

MR. FERNANDES: I'm sorry? Yeah, a chick. I'm not going there.

BY MR. FERNANDES:

Q. Didn't you learn that in January of this year that a juvenile had separated from its parent and had associated with

subadults?
A. How do you know that blue over blue yellow is not the parent?
Q. Well, in any event, doesn't it say for the rest of the winter b-Y -- b/b-Y and chick mostly roamed --
A. And unbanded juvenile. So that means the juvenile is the juvenile of the adult. So the juvenile --
THE COURT: Of b/b-Y?
THE WITNESS: -- is with the parent.
BY MR. FERNANDES:
Q. Okay. And they're associating with subadults?
A. Yes.
THE COURT: You lost your point there, so move on.
BY MR. FERNANDES:
Q. Okay. Well, my point is is when you're counting families, adult, adult and juvenile, and your whole methodology is if a juvenile is missing, that means -- if a juvenile is missing, it's dead, or if an adult is missing, it's dead, because you're thinking the families are all in three units.
A. Sir --
THE COURT: Whoa, whoa, whoa.
BY MR. FERNANDES:
Q. If an adult and a juvenile is associating with a subadult, that methodology doesn't work.
THE COURT: I don't think that's correct.

MR. FERNANDES: Okay.

THE COURT: Go ahead.

THE WITNESS: That's not correct, because you can see in the report, I say for the rest of the winter -- I kept track of this one parent with its, with its juvenile or chick, and it says it mostly roamed the southern tip of the refuge, almost always associated with subadults. So I kept track of that chick the entire winter, and I could tell that that chick survived.

BY MR. FERNANDES:

Q. Well, let's look at DX 170.

MR. BLACKBURN: Excuse me, Your Honor, before we move on, under optional completeness, if we could just read the second sentence in.

THE COURT: I don't think that applies in federal court, but you're welcome to.

MR. MUNDY: Well, it answers the question you had raised yesterday with Dr. Chavez about the year of the shooting, and it's just to help the Court. This is the '89 report, and it's discussing this as the year of the shooting of the bird. And so it's just a helpful point to the Court, to answer the question you asked to Dr. Chavez.

THE COURT: Could you, could I see the next couple of sentences?

MR. MUNDY: Well, you can read them as easy as, we

were just trying to help you to answer a question you had asked yesterday.

THE COURT: I appreciate that. I need it. I need it. Could I see the next couple of sentences?

MR. MUNDY: I think it says it actually right there on the bottom half of the blow-up part, just saying about the, discussing the shooting incident.

MR. FERNANDES: "However, on January 4th, the day after the shooting," and again on February 1st is the reference, but directly below the last yellow marking here.

THE COURT: So what do I need to know from that?

MR. MUNDY: Well, it's just helping -- yesterday you had asked Dr. Chavez about the year --

THE COURT: The year of the shooting.

MR. MUNDY: -- that a whooping crane was shot. And this is saying it's 1989. It was just to answer the question you had.

THE COURT: I think it was yesterday someone said 1990, or thereabouts. Thank you.

THE WITNESS: This is a good example on that. When that crane was shot, I was actually up in the air doing a census flight. And when I landed and drove back to the refuge office, I reported, "We've got a missing adult out there." And the secretary said, "Yes, we've been in touch with law enforcement, and there's been a shooting."

MR. FERNANDES: Let's --

THE COURT: Were they on the refuge when they, when he did that?

THE WITNESS: No, it was on San Jose, it was on the edge of the bay next to San Jose Island. It was --

THE COURT: Do you think he was shooting at ducks or geese or something?

MR. FERNANDES: He, my understanding is he was. It was his first time he had ever been hunting.

THE COURT: That was what I heard, too.

THE WITNESS: He was --

MR. FERNANDES: It was a lawyer from, let's just say a prominent firm in Houston.

THE COURT: I know exactly. I know his name.

MR. FERNANDES: My information, he was shooting anything that flew over.

THE WITNESS: Okay.

THE COURT: Certainly a big target.

BY MR. FERNANDES:

Q. Let's go to Defendant's Exhibit 170. Pull it up so we can see it easier. Does that appear to be your 1990-1991 report?

A. Okay.

Q. Let's go to Page 6, which is at TS 821. Do you see there, we're back to chick again. Do you see there under Solitary Juvenile, it says, "This chick would sometimes be close to the

territorial adults" --

THE COURT: Let me read it from the beginning.

MR. FERNANDES: Sure.

(PAUSE.)

THE WITNESS: Yes, there --

THE COURT: Okay. Go ahead.

BY MR. FERNANDES:

Q. All right.

A. I'm just saying there's an example of a family group with the juvenile showing quite a bit of independence that I was able to track and keep track of for the entire winter. I made no conclusion that that chick had died.

Q. Didn't those color bands that you were using greatly enhance your ability to -- greatly enhance the accuracy of your census counts?

A. It definitely increased the accuracy. I'm not sure about the word "greatly."

Q. Okay. Let's look at -- let's turn real quickly back to Defendant's Exhibit 157, your article that you wrote, under Conclusions. Let's go to the Conclusions. I think it's Page 3.

In your conclusions in this article, didn't you conclude, "Color bands greatly enhance the accuracy of population censuses and aid in differentiation of adult and subadult cranes and documentation of mortality"?

A. Yes, that's correct.
Q. Okay. Now, let's go to Defendant's Exhibit 171. Does that appear to be a true and correct copy of your 1991-1992 winter report?
A. Yes, it is.
Q. Let's go to Page 38. Do you see here where it says, "On April 14th, only 12 cranes remained on the wintering grounds, including one family group, 8 subadults and the orphaned Redfish Slough juvenile that had been wintering with subadults." Do you see that?
A. Yes, I do.
Q. So hadn't that orphaned Redfish Slough juvenile been wintering with subadults that winter?
A. That's correct.
Q. Okay. Now, because of color banding, didn't you also learn that a crane that was presumed dead during two separate winters was still alive?
A. (No response.)
MR. FERNANDES: Let me just go to Defendant's Exhibit 138. First pull this up and let -- pull up the top so Mr. Stehn can see it.
BY MR. FERNANDES:
Q. Does that appear to you to be a, I guess this is old school, an old document. It's probably just a memo from Mr. Lewis to you.

A. Yeah. That's the cover, the cover memo for that.
Q. Okay. Let's go to Page 8 of this. Oh, this is where it's -- it's on the '89-'90 report.
MR. FERNANDES: Why don't you pull that up so Mr. Stehn can see this.
BY MR. FERNANDES:
Q. Does that appear to you to be a true and correct copy --
A. Yes.
Q. -- of the August 1990 report?
A. That's correct.
Q. Okay. Let's go to Page 8 of this report, TS 756. Do you see there in this report -- didn't you initially in this '89-'90 report that the subadult YbY-GwG was a mortality? And don't your written hand notations then indicate that you determined that it was not dead because it was back at Aransas in the fall of 1990?
A. This is the '89-'90 winter?
Q. Yes, it is.
A. Or '88-'89? I can't remember.
Q. '89-'90.
A. Yes, you're correct there.
Q. Okay. And then if you look at the winter of '93-'94 report, that's DX 137. Does that appear to you to be a true and correct copy of your May 1994 report?
A. Yes, it is.

Q. And if you look at Page 7, wasn't that same crane subadult YbY-GwG reported as one of the mortalities on the '93-'94 report?

A. Okay, I'd have to see the paragraph above that.

MR. FERNANDES: Could you show him the paragraph above, please.

THE WITNESS: See, I have a date missing.

MR. FERNANDES: Pull the paragraph -- here we go.

BY MR. FERNANDES:

Q. Does that help?

A. See, this is, this is -- okay. Let me read that.

(PAUSE.)

A. Yes, that's correct. And this is the -- these are subadults, and as I pointed out yesterday in my testimony that it is extremely difficult to point out subadult mortality, because they're not in territories and they roam around. So these are instances where I made mistakes.

Q. So then to the extent that -- well, let me strike that.

And didn't you learn that in spring of 2003, this crane was still alive?

A. That's what my handwritten note indicates.

Q. And when you say, when you list your percentages of detection, and you were talking about yesterday your 96 percent detection rate, when you determine your detection rate, don't you do it based upon -- well, you don't do it based upon the

peak flock size at the beginning of the year, do you? You do it based upon whatever the flock size is during that particular survey. In other words, if four cranes had already died by, let's say March, don't you look at how many cranes you observed of the total flock size at that time?

A. Yes. So in that instance, it would be four less than the peak flock size.

Q. Okay. And so when determining, for example, your detection rate, this crane would have been included in that calculation, would it not?

A. That's correct.

Q. Now, just so I'm real clear, is it your testimony that juveniles can survive if they separate before they reach Aransas, but they can't survive if they separate while at Aransas?

A. Again, there are instances where -- there are specific reasons why they separate at Aransas where they can survive, with re-mating, that sort of thing.

Q. Well, haven't those cranes that have separated before, the juveniles that have separated before they've arrived at Aransas been observed in flocks with other, with sandhill cranes?

A. That's correct.

Q. And aren't there sandhill cranes on the wintering grounds?

A. Sometimes, yes.

Q. Let's look at your first aerial census in 2009-2010. I

promise this is the only one I'm going to go through. I'm not going to go through all 12. Let's go to Defendant's Exhibit 161. Does Defendant's Exhibit 161 appear to be your first aerial census for the year 2009-2010?

A. Yes, it's not the original report but it looks like a forwarded copy.

Q. And let's look at what you say in this first paragraph. You say, "With that number of juveniles produced" -- because as of November 12th, 2009, you know, don't you, how many juveniles have been produced in the wintering grounds in Wood Buffalo, do you not?

A. On the summering grounds, you mean?

Q. I'm sorry, the summer grounds.

A. Yeah. In most years, they have an estimate of the number of juveniles that fledged in August.

Q. Okay.

A. So we don't know how many of those birds may have died after fledging in August and how many may have died in the fall migration.

Q. Okay.

A. But we have an estimate, yes.

Q. And in this report, don't you say, "With that number of juveniles produced," in other words, that estimate from the summering grounds, "the flock may experience a break-even year, with a flock total around 247 expected." Do you see that?

A. Yes, I do.
Q. So weren't you expecting the flock size during the winter of 2009-2007 (sic) to be 247?
A. In what winter? I --
Q. This is the winter of '09-'10. This is your --
A. Oh.
Q. This is your November 12, 2009, report.
A. Well, I have -- I read, I read a different estimate I made in a document that I estimated 260 plus, and that's in my 2009-'10 summary report that I believe.
Q. Yeah, and that --
A. So in other words, I'm making different estimates, because you don't know what it's going to be.
Q. And what you're referring to is after the winter was -- much later in the winter, when the cranes had begun to arrive, you revised your estimate, did you not?
A. I don't remember.
Q. Well, okay. But in any event, on November 12th --
A. No, because I'm making that estimate long before the cranes get there that winter. That estimate's made -- I usually do it, the media is always interested in how many cranes are going to arrive, and I make this estimate, because when the media hears that 30 juveniles have been produced, they always add those 30 into the population total, and they do not take into account mortality that may have occurred between

April and November. So I'm trying to keep the media from speculating that we have all these extra whooping cranes that are not going to show up.

Q. Just so I'm clear, on November 12th, 2009, did you expect 247 cranes to arrive in Aransas?

THE COURT: In '09?

MR. FERNANDES: Yes, in '09.

THE COURT: In the fall of '09?

MR. FERNANDES: Yes.

THE COURT: Okay.

THE WITNESS: As a very rough guesstimate, yes.

BY MR. FERNANDES:

Q. And how do you go about doing those rough guesstimates? Do you assume a typical mortality rate during migration to arrive at your estimates?

A. That is correct.

Q. And isn't a typical mortality rate approximately 8 percent?

A. Yeah, 7 to 8 percent probably.

Q. So if 247 left Aransas in April of 2009 and you had the typical mortality rate of 8 percent, that would have been roughly 20 cranes dying during migration?

A. Somebody help me with the math.

Q. Um --

A. 247 times what?

Q. 8 percent.
A. 8 percent. That's, that would be a maximum figure I would expect. I would probably on an estimate use something closer to 5 percent or something, but it could be 8 percent.
Q. I'm just trying to get a feel for how you got to this 247.
A. Okay.
Q. Let's multiply 247 times 8 percent. What do we get?
MR. FERNANDES: Can somebody who's quicker than me out there --
THE COURT: He said it's more, more likely 5 percent. So that would be 12.
MR. FERNANDES: Okay.
THE COURT: Less 12, plus the chicks.
MR. FERNANDES: Can we do two numbers, the typical year --
THE COURT: Sure.
MR. FERNANDES: -- whatever 8 percent, and then we'll do the 12 as well, because I'm just trying to figure out a range how we get in here.
BY MR. FERNANDES:
Q. I guess 8 is going to be 16, and roughly 20, it looks like.
A. Roughly 20.
Q. Okay.
A. If it's 8 percent mortality.

Q. All right. And so if it's 5 percent, you go from 247 minus 12, you get to 235. And if it's the typical year, 8 percent, and it's 247 minus 20, you get to 227. And then let's talk about the chicks that we know about that were going to be migrating back from Canada. So if you had a, roughly anywhere from 227 to 235, that's what you're expecting the mortality to be --

A. I'm --

Q. I'm sorry.

A. I'm just --

Q. Okay. Let me --

A. This is hard to visualize when you're just throwing all these numbers at me.

Q. All right. Then let me go at it this way.

A. I wonder if we should write it down or something.

Q. Do you want to have a pencil or paper to write it down?

A. Yeah.

MR. FERNANDES: Okay.

THE COURT: Okay. So then you add the, how many chicks?

MR. FERNANDES: That's what I was getting to.

THE COURT: 33 chicks?

MR. FERNANDES: No, I don't think there's 33.

THE COURT: Well, how many chicks were there?

THE WITNESS: I thought it was 22.

MR. FERNANDES: I think it's 22.
THE COURT: 22 chicks. Sorry.
MR. FERNANDES: Okay.
THE COURT: So how many showed up in '09? How many pelicans (sic)?
THE WITNESS: I believe it was 264.
THE COURT: 264.
THE WITNESS: So you're saying 247 plus the 22 chicks, minus 20 birds, which is 8 percent mortality. So a reasonable estimate, a high -- a conservative estimate would be 249. And I have, in another, in my summary report, an estimate made at a different time of 260 plus.
BY MR. FERNANDES:
Q. And that's my point, here where you say, "With that number of juveniles, the flock may experience a break-even year with a flock of around 247," weren't you estimating a typical mortality event? And then you add on the 22 chicks we knew were coming back, which led to an expectation of 247, roughly 247, 249 flock size for the winter of '08-'09? I'm sorry, '09-'10. Isn't that what you meant by a break-even year, if you look at the reference in your --
A. That's correct. But again, elsewhere I estimated 260 plus. So we've got two different estimates of 247, or using the 20 -- the 8 percent figure, we came up with an estimate of 249, and elsewhere I wrote, I estimated 260 plus. So it all

depends on what you, what you think the mortality might be.
Q. And that's my point. When you ultimately revised it to 260 plus, that was at a point in time where more of the cranes had migrated to Aransas. Correct?
A. I'm trying to think on the dates on when I made those two estimates. This 247 estimate was --
Q. Well, let's move on.
THE COURT: That was in the, I guess that was in the --
MR. FERNANDES: November.
THE COURT: -- November, the one that was published after the '08-'09 year.
MR. FERNANDES: Yeah. No --
THE COURT: Is that right?
MR. FERNANDES: This was actually the very first aerial survey the following winter.
THE COURT: Okay.
THE WITNESS: But actually what happened is I had estimated, in the, I believe in my -- I've got my winters messed up here, but when I learned of the Canadian results, I estimated 260 plus. It turned out we ended up with 264. And there were the 22 juveniles added, and there were actually five white plumaged birds that died between April --
THE COURT: And November?
THE WITNESS: -- and November, so --

BY MR. FERNANDES:

Q. And to get to 264, you would have to assume that instead of an 8 percent mortality or instead of a 5 percent mortality, we had a 2 percent mortality. Right?

A. Whatever 5 divided by, I believe 247 is.

Q. Okay. Okay.

A. Right. It was a low, it was a lower than expected, lower than average mortality year.

THE COURT: You know, you know what my problem is with all this? I'm going to tell you, so we can think about it.

MR. FERNANDES: Uh-huh.

THE COURT: And you can help me. I know that the whooping cranes are an endangered species.

MR. FERNANDES: Uh-huh.

THE COURT: I know that they're important in our fundamental ecosystem.

MR. FERNANDES: Uh-huh.

THE COURT: And that every effort should be made to save them. Now, there are other endangered species around the world, and somehow they conduct a count. This is the only human on earth that has been counting these annually in our area. So my reaction is to go with his count. So I understand where you're coming from, but somebody has to tell me how these things are usually done and what is accepted and the usual norm

or deviation or whatever. Because just picking away at --

MR. FERNANDES: Yeah, okay.

THE COURT: -- you know, those, really those 23 showed back up in Canada, it's not --

MR. FERNANDES: Yeah.

THE COURT: I just need to know what is usually accepted, standardly accepted in the scientific community.

MR. FERNANDES: Here's what's generally accepted, why I said at the outset we're not moving to exclude population counts, because those are extremely important tools for managing an endangered species.

THE COURT: So somebody has to rely on these figures from somewhere.

MR. FERNANDES: That, and people do, on those -- those are peak numbers. But the peak numbers are not derived from this missing equals dead methodology. The peak numbers are derived by the peak accounts at the end of any given year.

For example, when we went from 270, the next peak number is 264. The next peak number is 283. The anticipation is 300 this year. The difference between those peak numbers is not 23, it's 6. Those peak numbers are done once a year. That's accepted methodology. That's called a population count. That's the type of survey that needs to be relied upon.

THE COURT: Okay. I know that your expert's going to tell me this, but my, my understanding is he's the one who's

been making them for U.S. Fish and Wildlife --

MR. FERNANDES: We're not contesting those. What I was going to -- just so it's real clear, in terms of the distinction --

THE COURT: He's Mr. Crane. You all -- before, you both said that.

MR. FERNANDES: The distinction is this. What is not widely accepted, in fact which is not accepted at all, is the concept of assuming a crane is dead every time it's missing. That's not --

THE COURT: I haven't heard him say that. Okay?

MR. FERNANDES: I'm sorry?

THE COURT: I haven't heard him say that.

MR. FERNANDES: This whole methodology that we've been going through is a --

THE COURT: No.

MR. FERNANDES: Yesterday he said --

THE COURT: I have not heard him say that.

MR. FERNANDES: Let me ask the question.

BY MR. FERNANDES:

Q. Isn't the methodology of basically counting cranes to arrive at a peak population count, as you testified yesterday, different from the methodology that's used to establish missing equals dead?

A. Let's be clear on this.

Q. Sure.
A. The methodology of the survey, when you're actually up in the airplane, is the same. You're trying to find every crane. Your analysis, they're very different estimates. The peak flock size is one thing, and what I determine is mortality, what I think is mortality is another thing. Yeah, they're different, you use different input.
Q. The peak flock size is those 11 flights we just went over, you look at all 11 flights, and you arrive at a peak flock size, do you not?
THE COURT: Of 270.
BY MR. FERNANDES:
Q. Of 270.
A. Right.
Q. Correct? To determine mortality, if you miss them on one or two flights, you determine mortality.
A. That's the minimum figure. Normally I --
THE COURT: He's telling me actually three flights.
THE WITNESS: Yeah, it's --
THE COURT: And this is the way I interpret that. He goes, if he misses them on one transect, he goes back on the second transect, which is two flights, even though it's the same plane, the same six-hour, five-hour, three-hour flight. Then he comes back again and looks for them on a separate flight. So that's three flyovers where he's missed. And the

way I understand it, these are juveniles that he's been concerned about, or adults that he's been concerned about, limping, away from their parents. I don't understand how on earth you could possibly figure out what is happening with an endangered species, except for the way he's doing it. So I need you to concentrate on that --

MR. FERNANDES: Okay.

THE COURT: -- in the defense. I mean, he's counting them, and one day they're there, and one day they're not there. And if theoretically one could show up later, a couple of years later, but 23, I don't know.

MR. FERNANDES: I would just say, for example, the 19 articles that TAP submitted in support of, in response to our motion to exclude, 17 of those articles, if they rely, what they relied upon is the peak population count. None of them relied upon the mortality count. In fact, some of those took the peak population count, and that's how they tried to -- that's how they tried to get to mortality, from using peak population counts, which are generally accepted, and doing statistical analysis --

THE COURT: Okay.

MR. FERNANDES: -- to try to get to mortality. The two, only two articles of those 19 what was relied upon is the mortality numbers, as opposed to the peak numbers, are two articles that were coauthored by Mr. Stehn.

THE COURT: Okay. I got it.
MR. FERNANDES: Okay.
THE COURT: I'm there.
MR. FERNANDES: All right.
THE WITNESS: There's one difference is --
THE COURT: But that, on the other hand --
MR. FERNANDES: I'll move on.
THE COURT: -- I see him just physically counting. So I mean --
MR. FERNANDES: Yeah.
THE COURT: -- this, I understand where you're going.
MR. FERNANDES: Yeah.
THE COURT: I'm with you. So I think maybe it would be a good idea to --
MR. FERNANDES: Let's move on.
THE WITNESS: Could I say one thing, Your Honor?
THE COURT: Yes.
THE WITNESS: There's just a distinction between 12-month mortality, and I, and at Aransas, I'm trying to find the mortality just at Aransas. So again, different analysis.
MR. FERNANDES: I understand that.
THE COURT: I understand both sides now.
MR. FERNANDES: Okay.
THE WITNESS: Okay.
THE COURT: Thank you.

BY MR. FERNANDES:
Q. Let's look at, let's look at, let's talk real briefly, DX 6, just real briefly, at your observations with respect to cranes going to fresh waters at certain salinities. Could you look at Page 64. Now, don't you report the --
A. Could you just let me find -- I'm sorry.
Q. I'm sorry.
A. 64. Let's see. My pages are messed up, so let me get them here. Okay, 64. In my next career, I'm not going to write so much. How's that for a vow? Okay. Page 64, sir. Go ahead.
Q. But if you do that, you can't come out of retirement and have all this fun.
A. That's true.
Q. Let's look at Page 64. Don't you measure salinity when you do your monthly blue crab counts?
A. Normally a volunteer has been doing that in recent years. Yes, that is when it is done.
Q. And don't you report the number of cranes at fresh water ponds when you perform your aerial surveys?
A. That is correct.
Q. So you don't measure salinity and observe the cranes at the fresh water ponds on the same day, do you?
A. Not necessarily, but in recent years -- in fact, in multiple years, if I was doing a flight, I would send this

volunteer who does the crab counts, and I would ask her to go down to the refuge boat ramp and take a salinity at the boat ramp, which is bay waters, and then I would have her walk out into the adjacent salt marsh and take a salinity there.

Also now it's all available on the internet. So I would do a flight and I would get the bay salinity off the internet.

Q. And don't you consider the cranes to be using the fresh water ponds if they're observed within 100 to 200 yards from those fresh water ponds?

A. Yes and no on that. It depends on their behavior at the time. Sometimes I -- 100 to -- yeah, maybe. Maybe that far. They do, they do go to those fresh water ponds and, and will go out and forage 15, 20 minutes and end up a couple hundred yards away from the pond. And it's, I've always admitted that it's kind of, in a record keeping sense, I never quite knew whether to call that use of a burn, use of an upland, use of a fresh water pond.

THE COURT: Where is that exhibit, so I can have it by me, that shows the peak count each year? That's what you want me to rely on. Right?

MR. FERNANDES: Yes. That's, I think it's --

(Counsel conferring off the record.)

THE COURT: Is there one?

MR. FERNANDES: 79 -- It's 77 or 79. 77 and 79 should have it, Defendant's Exhibit.

THE COURT: Do you have an extra one?

MR. MUNDY: I'll give you mine.

THE COURT: Thank you.

MR. MUNDY: It is an exhibit. We can find the number. Is that the one table you're thinking of, Your Honor?

THE COURT: The flock size, yeah, the peak winter flock size. That's what you want me to use. Right?

(Counsel conferring off the record.)

MR. FERNANDES: I'll pull it up and --

MR. BLACKBURN: Your Honor, may I simply make a statement?

THE COURT: You may.

MR. BLACKBURN: That our analysis is based on mortality numbers, not on peak flock size, other than to give a percentage representation. Our Dr. Sass, Dr. Ensor, all of those analyses were on mortality figures, not peak.

MR. FERNANDES: This visual that we have --

THE COURT: I got that.

MR. FERNANDES: This visual that we have up, this is Exhibit what, Chris?

MR. TAYLOR: Defendant's Exhibit 77, on Page 6.

MR. FERNANDES: This is a chart created by TAP. This is what they use when they recruit members. Remember, we covered this with Dr. Archibald. These are peak numbers. Every number on there is a peak number, except that last

number. 247 is not a peak number. The peak number for that year is 264. Then the next peak number is 283. And now we're expecting 300.

THE COURT: Okay, wait.

MR. FERNANDES: Sure.

THE COURT: And on the left is the flock size in Canada?

MR. FERNANDES: That is just the total flock size of the Aransas-Wood Buffalo flock, the peak counts. If you see the --

THE COURT: Do we have -- if I'm going to be looking at flock sizes, I need to look at the --

MR. FERNANDES: Okay.

THE COURT: -- flock sizes in Canada and the flock sizes in Aransas.

MR. FERNANDES: That's not how it's counted. See, they only count once a year. They don't count in Canada.

THE COURT: They don't count in Canada at all?

MR. FERNANDES: I'll let Mr. Stehn --

THE WITNESS: They're unable to. It's too big an area and --

THE COURT: Okay.

MR. BLACKBURN: That's the same chart, Your Honor, with the exhibit number on it.

THE COURT: Thank you.

MR. FERNANDES: So the 11 surveys we went today, that's what resulted in that 270 number. That's the number we're saying we don't contest. The next year when they did the same analysis, it resulted in 264. The next year, 283. And then this year obviously they haven't done it yet because they haven't completed it.

THE COURT: All right. Well, that leads me to think that there was a mortality rate bigger than usual.

MR. FERNANDES: Well, if you kind of --

THE COURT: Not six, but it should be increasing with the chicks every year. So I, this is my problem with this --

MR. FERNANDES: Yeah.

THE COURT: -- this whole deal --

MR. FERNANDES: Uh-huh.

THE COURT: -- is that it should be going like from 220 to 237, 237 to 266, 266 to 270, which was low, 270 then to 264. So exponentially, it decreased significantly, instead of increasing as exponentially as it has been, 20 to 30 a year.

THE WITNESS: Your Honor, could I make a comment?

MR. FERNANDES: Sure.

THE WITNESS: There's a ten-year cycle -- to complicate things -- there's a ten-year cycle.

THE COURT: I don't need this.

THE WITNESS: I don't need it either.

THE COURT: Go ahead.

THE WITNESS: So what I'm saying is every ten years, roughly at the turn of a decade, we have a very mathematically predictable drop in the population. And so you don't expect steady growth. Does that, does that clear up anything?

THE COURT: Yes.

THE WITNESS: And that 264 drop, if I remember correctly, was right, was right at the decade.

MR. FERNANDES: At the ten-year decade.

THE WITNESS: Right. Bingo. The mathematicians just love --

THE COURT: So that was a predictable drop?

THE WITNESS: Yes.

MR. FERNANDES: If you look at the ten-year cycle.

THE COURT: And doesn't have anything to do with the '08-'09 mortality rate.

THE WITNESS: Well, that -- no, that -- it could, that's part of it. That's part of the mortality. That's part of why the --

THE COURT: Oh, that's why it drops every ten years? Because they're -- obviously they're dying off. They're not -- is it not reproducing, or they're dying off.

THE WITNESS: No, it seems more connected with the reproduction up in Canada. But obviously mortality events at Aransas affect that.

THE COURT: Okay. But we can rule out the mortality

in Canada if you can tell me the number of chicks that are coming every year. Right?

THE WITNESS: No, because you have all the white adults in Canada that could be dying.

THE COURT: Well, but you could tell me that the chicks were increasing every year, or they were decreasing every, on the tenth year.

THE WITNESS: No, not that -- well --

THE COURT: And then we know what's happening in Canada as far as reproducing. Right?

THE WITNESS: I missed that last part.

THE COURT: I probably missed it, too. You said you thought that every decade reduction had to do with reproduction. So you ultimately --

THE WITNESS: Yes.

THE COURT: -- were able to measure that with chicks returning from Canada.

THE WITNESS: That's correct, that's correct.

THE COURT: That's my point.

THE WITNESS: Right.

THE COURT: So if the chicks are increasing, then the reproducing is not decreasing. So --

THE WITNESS: Right. But there's, probably in that ten-year cycle there will be a bad production year. And what they found is that --

THE COURT: Have you had -- was 2009-2010 a bad production year? Or were there more chicks than usual?

THE WITNESS: What was the number of chicks? Was it 22?

MR. FERNANDES: 22. 22.

THE WITNESS: I would say that's below average.

THE COURT: Okay.

MR. FERNANDES: And that's what -- remember the 88 to 86 crazy, the number that we couldn't figure out. That was trying to show the average. 88 was the average, and it was put at 86.

THE COURT: It's time to go to lunch.

(Recess from 12:04 p.m. to 1:33 p.m.)

THE COURT: Are you ready?

THE WITNESS: Not exactly a sprint to get up here now. It's that post-lunch feeling.

THE COURT: Mr. McCarthy.

MR. McCARTHY: Yes, ma'am.

THE COURT: It's been brought to my attention over the lunch hour that you and I are messing up the record with our coughing. Apparently nothing can be done about me, but I can put you away from, put you on this table by yourself, where there's no microphone.

MR. McCARTHY: Yes, ma'am.

THE COURT: Is that all right?

(PAUSE.)

THE COURT: Let me know if you need anything over there.

MR. McCARTHY: Thank you, Your Honor.

THE COURT: You're pitifully alone.

MR. FERNANDES: It looks like time out.

THE COURT: Pardon?

MR. FERNANDES: It looks like time out.

THE COURT: Yeah, it does. Okay. Everybody has to stop talking. Ready?

MR. FERNANDES: Yes, Your Honor.

THE COURT: Thank you.

BY MR. FERNANDES:

Q. Let's put up, I believe it's Exhibit 77. Now, yesterday, Mr. Stehn, you mentioned that you had a long-time pilot, and then you changed that pilot. When did you change that pilot? Do you remember what year it was?

A. No, I don't. I'd say 2006 or 2007.

Q. Okay. And did you change the aircraft that you were flying in in the same year that you changed the pilot?

A. That's correct.

Q. Okay. And let's pull up those numbers at the end there. Just pull up so we can see it good. I noticed one of the largest increases I've ever -- I see on this graph is 30 cranes from 236 to 266. Isn't that the year that you changed pilots

and started flying with a new aircraft?
A. I'd have to look up that date.
Q. Okay. Well, I'll represent to you that remember, you mean the date that you changed?
A. That I changed planes. But more relevant, sir, is the number of chicks that were hatched in Canada.
Q. Okay. But you just don't remember the exact date? But that's reflected in those aerial surveys, is it not?
A. Correct.
Q. The pilot.
A. Correct.
Q. Let's go --
A. I think this paper also, the Stehn and Taylor Exhibit 123, it certainly might say in there, methods -- well, I'm not seeing it in a quick glance.
Q. All right. The aerial surveys will reflect that, though.
A. Right.
Q. Did you ever prepare an environmental assessment prior to placing 13 supplemental feeders at the refuge during the winter of 2008-2009?
A. No, we did not.
Q. Let's go to Exhibit 38. Does Exhibit 38 appear to you to be a true and correct copy of the 2008-2009 recovery activity report?
A. The one page I can see, yes, it does.

Q. Let's go to Page 6, please. Do you see there where it says, "A new management action implemented by Dan Alonzo" -- and who is Dan Alonzo?
A. He is the refuge manager project leader at Aransas National Wildlife Refuge complex.
Q. "In February 2009, refuge staff posted 'Closed to Crabbing' all waters within the boundary of Matagorda Island National Wildlife Refuge, including marshes and interior lakes. Commercial fishing has never been allowed on the National Wildlife Refuge, so this effort was simply a decision to start enforcing the law." Then at the end, it says, "The action should make additional crabs available for the whooping cranes."

If you believe that the blue crabs were so important to the cranes, why did, why was a decision made -- why was a decision -- why was crab trapping permitted at the refuge?
A. The politics trumped the biology of -- the waters on Matagorda Island National Wildlife Refuge are actually state owned, and they have a tradition of open hunting and fishing and commercial trapping going back to the late 1800s. And our regional office was very hesitant about doing something about that and enforcing the nationwide statute that says there is no commercial fishing or crabbing on national wildlife refuges.
Q. Don't you believe that the commercial crab trapping impacts blue crab abundance?

A. Yes, I believe it does.
Q. You're not aware, are you, of any tests that have been performed to determine whether your methodology for presuming cranes are dead if not observed during aerial surveys are reliable, are you?
A. Okay, please ask that again.
Q. Sure. And I want to focus on the methodology of assuming that a crane is dead if not observed on an aerial survey. Are you aware of any tests that have been performed, independent tests, to determine whether your methodology for presuming cranes are dead if not observed during aerial surveys are reliable?
A. I would say there have not been any independent tests. I'm the only one flying.
Q. For how many years?
A. Twenty-nine.
Q. Now, you're not aware, are you, of your methodology for presuming cranes are dead if not observed during aerial surveys being subjected to peer review and publication, are you?
A. The publications I've done have all been peer reviewed. They talk about -- I assume they talk about missing cranes and mortality, and so, you know, not, not specifically that aspect, but other scientists have looked at that.
Q. Your 2008 paper, for example, the, I think it's Exhibit 123, the paper that you authored with Mr. Taylor, that paper

deals with your methodology for counting cranes and coming up with a peak population number, does it not, and the difficulties of detecting it when arriving at those peak count numbers?

A. Yes, that's correct.

Q. And your paper that we showed you earlier, which I believe is 157, that paper talks about what you've learned from color banding the cranes, does it not?

A. That's correct.

Q. You didn't apply any error rate, did you, to account for the possibility that the nondetection, that the nondetection may have been the result of movements of the cranes?

A. Okay, please repeat that again.

Q. Sure. I'm sorry.

A. I'm with you, just --

Q. Yeah.

A. -- one more time.

Q. Before -- did you apply any error rate to account for the possibility of nondetection --

A. Well, I --

Q. -- because of the movement of the cranes?

A. I'm very aware of potential error, and you've pointed that out in my census flights that these numbers, sometimes I think there's 260, and then it might be 266, and you know, have I -- I don't know what you mean by that terminology. You're using a

statistical term that is beyond me. If you want -- there were two specific words you used that threw me.

Q. Okay. And what words were those? Let me go at it again.

A. Yeah, say it again.

Q. Let me ask you this. Did you apply any error rate to account for visibility bias?

A. Well, you've changed the question now. Error rate -- okay. Say that again.

Q. Sure. Let's go to Exhibit 123.

A. Well, you're not repeating -- sir, you're not repeating. If you would just give it one more time, I got it.

Q. Okay.

A. It's not confusion, it's my, it's probably my post lunch time concentration.

Q. I'll try to do a better job of framing the question.

MR. FERNANDES: Let's go to the Factors Affecting Detection on 123. Pull up Factors Affecting Detection of Birds. Pull it up so I can see that whole section, please.

BY MR. FERNANDES:

Q. In your article that you wrote with Mr. Taylor, there was a title, a section heading called Factors Affecting Detection of Birds, was there not?

A. That's correct.

Q. And one thing that you listed was Field of View. Do you see that?

A. Yes, sir.
Q. Did you attempt to apply any error rate to account for the possibility of nondetection as a result of field of view?
A. That would be part of the analysis I did on the percent of the flock that we were finding on every flight, which is the 95 percent. So that would take into account the difficulties with all of these factors listed there.
Q. Okay. Well then, when you got your 270 number, did you then reduce it by virtue of an error rate?
A. No, because this is not a survey. This is a census, where you're finding every bird. So you don't throw in a corrective factor.
Q. All right. Well, let's not talk about your population counts then. Let's go back to talking about missing equals dead. Did you apply any error rate to account for the possibility of visibility bias when you were determining that a crane that you hadn't observed was dead?
A. That is something I'm very aware of every time I fly. And that is why I am so cautious of going two or three or more flights before I will declare it dead, because, you know, I don't want to find out two months later that I simply made a mistake and overlooked the crane. So I'm very cautious. I make extra circles. I make extra trips through that territory. I focus on that area the next time. I'm very aware that sometimes an entire family group moves from one territory to

another. I mean, this is just, this is like -- this is my expertise on what these cranes are doing and how the distribution might change and what that change, what I'm seeing, what that means.

Q. My question is, is when you presume the crane that had not been observed was dead, did you apply an error rate?

A. I don't know what you mean by "apply an error rate."

Q. Fair enough. Do you believe that your method for presuming mortality if cranes are missing are repeatable by others?

A. Absolutely, they are.

Q. I thought you told us earlier that the person who's doing it now still hasn't done a survey because they're trying to train them.

A. Well, he, I trained him last year on some flights. So I would expect if he goes out and finds one adult with one chick where he had previously seen two adults and a chick, he's going to come up with the same conclusion I did. The difference is that he doesn't, he hasn't yet learned all those territories. So he's going to have to, he's going to need a year to, a year of experience.

Q. Have you ever done any study to determine the energy and nutritional value of the foods, of any of the food items available to the cranes at Aransas?

A. I, myself, have not, no.

THE COURT: Y'all try to remember to stop talking when I'm coughing, for the record purposes. I'm sorry.

MR. FERNANDES: No problem. Pass the witness, Your Honor.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Now, Mr. Stehn, there's a lot that was made about the notes that you wrote and about your descriptions of a difficult situation during 2008-2009. Do you remember that conversation?

A. Yes, I do.

Q. And would it be fair to say that you're truthful about what you encounter out in the, on the refuge and during your surveys?

A. Exactly. What I, what I see is what I report.

Q. And would it be fair to say that you're transparent?

A. Yes, sir. And when there's uncertainty, I -- it's right there in the reports. It was pointed out to us this morning.

Q. And given the way that you go about your counts and particularly your counts on mortality, would it be fair to say that you have two separate goals when you go out and you survey, one of which is to try to get some total population count, and one that is specifically honed in on mortality?

A. Right. I'm hoping, I'm hoping to do both on every flight.

Q. And if, in fact, you start seeing, like you did in 2008-2009, a series of missing birds, on your next flight, does

that become a priority to try to find those missing birds?
A. That's correct. Absolutely the first priority.
Q. So rather than focusing on total counts that next time, you're looking for those either juveniles or adults that you know from the territories that are not there?
A. Well, I still hopefully can do both.
Q. But if you have to choose between one or the other, which one?
A. You choose the mortality.
Q. And now there was a question just before lunch about some ten-year cycle on the breeding grounds. And did that cause the mortality we're talking about during the winter of 2008-2009?
A. I guess there's confusion on that. The ten-year cycle is for the entire flock. Okay? Every ten years, there's a dip in the, in that peak population figure. Now, that's a combination of mortality in all the different parts of the range of the birds, migration, nesting, wintering, and it's combined with chick production up in Canada. And whatever all those combinations are, it just seems to drop for one year around the turn of the decade.
Q. But in your opinion, was the death of 23 birds caused by anything other than food shortages at Aransas?
A. No, sir. The population cycle -- the ten-year cycle, we believe, is something going on mostly in Canada.
Q. And so in terms of the population of the wintering flock,

when you come up with 23 dead birds, your belief is that that is related to conditions at Aransas unrelated to the ten-year cycle?

A. That's correct.

Q. And with regard to crab trapping, does crab trapping happen every year?

A. Yes, it does.

Q. And with regard to peer review, do you report your mortality and population figures to the Recovery Team?

A. Yes, I do.

Q. And do they review these numbers?

A. They're aware of them, sure.

Q. Anybody tell you that your methodology is not appropriate?

A. No. Nobody's questioned it for 29 years until this, this trial.

MR. BLACKBURN: Thank you, Your Honor. No further questions.

MR. FERNANDES: Your Honor, if I could be just real brief?

THE COURT: Yes, sir.

RECROSS-EXAMINATION

BY MR. FERNANDES:

Q. First of all, when you look at the Recovery Plan, you see, do you not, that they specifically talk about your population counts in those Recovery Plans, do they not?

A. They talk about the essential need to do them.
Q. Okay.
A. And they list the results of the peak flock size determined. Is that what you mean?
Q. Let me move on.
MR. FERNANDES: Your Honor, could I approach one more time?
THE COURT: Yes, sir.
BY MR. FERNANDES:
Q. Sir, let me show you what's been marked as Defendant's Exhibit 139. I forgot to do one thing. Just to kind of clear up the issue with respect to when the peak population estimate went from 247 to 263 in 2009 and 2010 --
A. I thought -- sir, I thought it was 264.
Q. I'm sorry, 264. Okay. But I think -- okay. Well, in any event, let's go to, what we showed you last time was the first aerial survey from 2009, the winter of '09-'10. Let's go to -- this, does Exhibit 139 appear to be, to you, to be a true and correct copy of the third aerial census dated December 10th, 2009?
A. Yes, with handwritten notations written after the fact, after the report was written.
Q. And if you look at this, it reflects, does it not, you say, "With that number of juvenile produced, the flock may experience a break-even year, with a flock around 247

expected." And that was your anticipated flock as of December 10th, 2009, was it not?

A. That is correct. But I pointed out earlier that I've made other estimates of 260 plus.

Q. We're getting there.

A. Okay.

Q. You're getting ahead of me again.

A. Okay.

Q. Let's go to Defendant's Exhibit 17. Does Defendant's Exhibit 17 appear to be your fourth aerial census, dated January 5th of 2010?

A. Okay, that's correct.

Q. And you see on this one, it says, "Sighted on the flight were 244 adults and 19 juveniles, which equals 263." Correct?

A. That's correct.

Q. So does that mean on January 5th, 2010, you actually counted 263 cranes?

A. That's correct.

Q. And then you go on to say, "This was an increase of 19 cranes since the previous flight conducted on December 10th, when some birds have still been in migration, and 244 cranes were accounted for." Do you see that?

A. That's correct.

Q. Then if you drop down to the last paragraph, it says, does it not, "The discovery of 19 additional cranes is really good

news." Right?
A. Yes, sir.
Q. And then you go on to say, "The current estimated flock size of 264." Does that refresh your recollection that you came up with your estimated flock size of 264 on January 5th, in connection with this January 5th, 2010, survey?
A. Okay. Give me that last sentence again, please.
Q. Sure. Was the first aerial survey that you arrived at your 264 peak count estimate the aerial survey of January 5th, 2010?
A. I'd have to review all of the census flights before that, but it appears to be, since I had 244 on the previous flight. So yes, that's the first time I came up with, are you saying 263, the 263 total?
Q. From 247 expectation to 264.
A. Oh, down there.
Q. If you look at the previous one, it was I believe 247, if you compare 139 with 17, which you should have in front of you.
A. I'm sorry, Your Honor, I'm lost.
Q. Okay. If you look at, back to 139, which is the previous aerial survey, the third aerial survey, could you go back to 139? Do you see here on the third aerial survey, on December 10th, 2009, you say, "With the number of juveniles produced, the flock may experience a break-even year, with a flock total around 247 expected." Do you see that?

A. That's correct.
Q. Okay. So this is the third aerial survey, December 10th, 2009. Now, let's go to the fourth aerial survey. Now, in the fourth aerial survey, you say, "The current estimated flock size of 264." Do you see that?
A. Yes.
Q. So did you increase your estimated flock size from the third aerial survey to the fourth aerial survey, which is January 5th, 2010, from 247 to 264?
A. I'm sorry I'm so dense on this, but I'm confusing -- my total guesstimate of what will come is completely different from the figures I'm deriving from these, from an actual survey. So they could be very different.
Q. Okay. I understand.
A. One is a guess, with no, with not a whole lot of science behind it.
Q. I understand that. Let me just --
A. Okay.
Q. -- go at it this way, and then we'll close.
THE COURT: Why don't you move on.
MR. FERNANDES: I am.
BY MR. FERNANDES:
Q. I was just -- "The current estimated flock size of 264 is surprisingly high, but indicates the survival between spring and fall of 2009 was excellent." Do you see that?

A. Yes.
Q. Okay.
MR. FERNANDES: Your Honor, at this point we, just for the purpose of clarity, I don't know that we've resolved the issue on this, whether or not he's being offered as an expert or not.
THE COURT: For mortality on whooping cranes?
THE WITNESS: Yes.
THE COURT: I'm going to accept him as that.
MR. FERNANDES: Okay, and I'm going to move, we will move at this point to exclude him under Daubert.
THE COURT: I just accepted him.
MR. FERNANDES: Okay.
THE COURT: So that's, you've got your motion on file. So I denied your motion.
MR. FERNANDES: But our motion was with respect to Chavez-Ramirez, and that's why I, for the purpose of --
THE COURT: Oh, okay. I thought you had one -- you don't have one for him because --
MR. FERNANDES: Because we didn't know he would be coming.
THE COURT: I'll recognize that and overrule your motion to challenge.
MR. FERNANDES: Okay. Thank you, Your Honor.
MR. BLACKBURN: I have nothing further with

Mr. Stehn, Your Honor.

THE COURT: Are you satisfied with your mortality figures of '08-'09 year as 23?

THE WITNESS: Yes, as a conservative, as a conservative number, yes, Your Honor.

THE COURT: Thank you. Can he be excused?

MR. BLACKBURN: Yes, Your Honor.

THE COURT: Now you can retire.

THE WITNESS: Thank you. It's sweeter the second time.

THE COURT: How do you want to work getting hours in?

MR. BLACKBURN: I'm sorry, Your Honor?

THE COURT: Getting his hours and his travel hours. I don't know where you live, but --

THE WITNESS: Aransas Pass. Travel is kind of irrelevant.

THE COURT: 45 minutes?

THE WITNESS: Yes, 30 to 40 minutes.

THE COURT: Half an hour, an hour transportation each day?

MR. BLACKBURN: He can just figure what time he thinks is --

THE COURT: But include the transportation.

MR. BLACKBURN: It was two full days.

MR. MUNDY: I'd say it's two full days. I mean, he

started the afternoon of Monday and we're past that, at least two full days.

THE COURT: So that's eight-and-a-half hours times two, seventeen hours.

MR. BLACKBURN: Seventeen hours.

THE COURT: At -- I just want to get this, you know, I don't like to leave loose ends. Okay?

MR. BLACKBURN: I guess we're going to need to -- do you accept American Express?

THE COURT: 3,600, divided by two. Is that right? Didn't we say 18 hours times 200?

MR. BLACKBURN: 18 times 200, that's correct.

THE COURT: 3,600. So each side, how much time do you need to give him $1800 each?

MR. BLACKBURN: I can probably figure out how to get that done fairly quickly, like with, by the end of the week for sure, Your Honor.

THE COURT: Mr. Fernandes?

MR. FERNANDES: The same. And for the address, if we could get the address.

THE COURT: You want to give, have you got -- I don't know if you have a home address, who has it. All right. Is that satisfactory, Mr. Stehn?

THE WITNESS: Excuse me?

THE COURT: Is that all right?

THE WITNESS: Yeah, that's great.
THE COURT: Okay.
THE WITNESS: Yeah, there's no rush.
THE COURT: He wants it by Christmas.
THE WITNESS: I'm in shock.
MR. BLACKBURN: So the total amount is 3600.
THE COURT: 1800 each.
MR. BLACKBURN: 1800 each.
MR. FERNANDES: There are two more parties on our side.
MR. BLACKBURN: I -- you worry about that.
THE COURT: You all can divide it any way you want to.
MR. FERNANDES: 1800 on each side. Okay.
THE COURT: Because I'm lumping the Intervenors and actually the regular Defendants together, if that's all right.
MS. SNAPKA: Your Honor, we have governmental entities involved, so if he could --
THE COURT: Pardon?
MS. SNAPKA: We have governmental entities involved, so if he could provide his tax ID number, so that we could include that as well.
MR. BLACKBURN: Oh, okay.
MS. SNAPKA: We have to account to the Government, Mr. McCarthy tells me.

THE COURT: Okay.

MR. BLACKBURN: We will make sure that payment gets made --

THE COURT: Properly.

MR. BLACKBURN: -- properly.

THE COURT: Thank you.

MR. BLACKBURN: Do you have an address there?

THE COURT: I guess they have to have the Social Security, your Social Security number. Is that what you're talking about, Ms. Snapka?

MS. SNAPKA: Yes, Your Honor, I believe that's correct.

THE COURT: Unless you have another entity.

MR. BLACKBURN: There's, he's going to put his Social Security number, Your Honor.

(Discussion off the record.)

MR. KAHNE: Your Honor --

THE COURT: One of you switched sides.

MR. BLACKBURN: One switched sides? Oh, yes.

THE COURT: Was he always a little shaky?

MR. BLACKBURN: He always was, that's right. He's back, you know.

THE COURT: Okay. Thank you. A straying juvenile, you think?

MR. BLACKBURN: It kind of depends on how I --

UNIDENTIFIED SPEAKER: This is my territory.

THE COURT: Okay.

MR. BLACKBURN: Now, what we'd like to do, we've gotten permission of the Defendants to call one "standing" witness out of kind of order of how we had talked about presenting the case. And David Kahne will present Debra Corpora for a very short "standing" presentation, with your indulgence.

THE COURT: Yeah, just to review that, the two, I can't remember, addressability -- redressability and I've forgotten what the other one was. I found that you had enough information to defeat summary judgment on standing issue, but not on the causation. Right?

MR. BLACKBURN: Then do we need to bring --

THE COURT: Yes, because that doesn't mean it works out forever. It just means to defeat summary judgment.

MR. BLACKBURN: Okay. So that's why --

THE COURT: I mean to defeat your getting summary judgment in that respect.

MR. BLACKBURN: Right. I understand. So we are now putting on this witness --

THE COURT: And that's fair enough. Is that the -- that's the way I meant it to be. Did everybody understand it that way?

UNIDENTIFIED SPEAKER: Yes.

MR. BLACKBURN: That's the way we understood it.

THE COURT: Okay.

MR. BLACKBURN: That's why we're bringing her in, because she's leaving town and we wanted to get her on --

THE COURT: Good idea.

MR. BLACKBURN: -- before she left town. David.

MR. KAHNE: Please call Debra Corpora. And just for the record, we also offered Dr. Archibald as well and the Crane Foundation as members of TAP.

(Witness sworn.)

THE COURT: Are you ready for your turn?

THE WITNESS: Ready.

THE COURT: You all want to get her some water, too?

THE WITNESS: That would be great.

THE COURT: Would you spell your last name for me? Everybody else has it.

THE WITNESS: C-O-R-P-O-R-A, Corpora.

THE COURT: Thank you.

DEBRA CORPORA, PLAINTIFF'S WITNESS NO. 6, SWORN

DIRECT EXAMINATION

BY MR. KAHNE:

Q. Would you please state your name for the Court?

A. Debra Corpora.

Q. And what do you do for a living?

A. I'm retired.

Q. What did you do before you retired?
A. I was a school administrator.
Q. And where do you live now?
A. Rockport.
Q. And where did you live before you lived in Rockport?
A. Robertson County, Texas.
Q. Why did you move to Rockport?
A. I moved to Rockport to bird, because it's a birding community.
Q. And how close is your home to the National Wildlife Refuge where the whooping cranes spend the winter?
A. By car, it's about 40 miles. By boat, it's about 12 miles.
Q. And how often do you, personally, visit the wildlife refuge?
A. Eight to twelve times a year.
Q. And is that all year round?
A. It is primarily in the winter, when the whooping cranes are there.
Q. And how do you go there, by car, by boat, by plane?
A. By car and by boat.
Q. And why do you go there?
A. To see the whooping cranes, and to conduct some bird surveys and other field trips with our bird club.
THE COURT: Do you do the Christmas count?

THE WITNESS: Yes.

BY MR. KAHNE:

Q. How many years have you been going to see the cranes at the refuge?

A. I have been to the refuge to see the cranes annually since the early '90s. After I moved to Rockport in 2004, I, now I go very regularly.

Q. And when you visit, do you sometimes bring friends, acquaintances along?

A. Yes.

Q. And what do your guests like to see when you go to the refuge?

A. Well, if we are going by boat, and as you leave and you enter the Intracoastal, you begin to see whooping crane families. And we love to see how they, how -- the actual family unit. We love to see how the adults feed the juveniles, how the adults protect and actually how they stand and guard their chick. If we're lucky, we will see them stab a blue crab and feed their juvenile. Have it, you know, crack it and have it so that the chick can eat.

We also love it when another male crane comes in and challenges the whooping family, the whooper family. And the other male -- they'll kind of have this duel. That's pretty cool.

THE COURT: Is that the plumage deal?

THE WITNESS: Yeah. When -- well, they actually will come in and kind of balk to each other and eyeball each other. And then usually one chases the other, the interloper out.

And we love to see them fly, because the wing spans are so magnificent.

And if we're really lucky, we'll get to hear them do their whooping sound. So we like all of it.

THE COURT: Sort of like mine?

BY MR. KAHNE:

Q. Now, I don't know if you were here when Dr. Archibald did this, but he actually treated us to a whooping sound.

A. Oh, I wasn't here.

Q. And if you would like, we'll give you that opportunity.

A. No, I trust you'll remember his sound.

Q. All right. Now, you --

THE COURT: He danced with one of them.

THE WITNESS: Well, I might do it in private.

MR. KAHNE: You want to follow up on that? Never mind.

BY MR. KAHNE:

Q. Looking to the future, how often do you expect to be going over to the refuge for similar activities involving the crane with others?

A. The same, eight to ten, twelve times a year. It, you know, it -- perhaps more.

Q. And are you personally a member of The Aransas Project?
A. Yes.
Q. And have you given money to The Aransas Project?
A. Yes.
Q. Are you active with any local birding organizations?
A. Yes.
Q. And what are you active with?
A. The Aransas Bird and Nature Club.
Q. And others as well?
A. Oh, yes.
Q. And with the Aransas Bird and Nature Club, do you have any official position?
A. I'm the president.
Q. How long have you been president?
A. Three years.
Q. And is the Aransas Bird and Nature Club also a member of The Aransas Project?
A. Yes.
Q. What's the purpose of the Aransas Bird and Nature Club?
A. Well, we're a grass roots organization. We are in -- we promote the natural world, with a special emphasis on birding. And we also assist local, state and federal agencies with conservation and habitat acquisition.
Q. Approximately how many members does the Aransas Bird and Nature Club have?

A. Ninety-five.
Q. And what kinds of activities does the bird and nature club do to accomplish its mission, particularly with respect to cranes?
A. Well, we offer field trips every year. We have a website with crane photos on the website, with field trips for our -- a whooping crane field trip, which is February 4th this year.
We also do a monthly bird survey at the Aransas Wildlife Refuge. This is just, we divide it into sections on the ground. We survey the other birds, and we usually get the whooping crane family that can be seen from the tower. Sometimes we also get another, maybe a crane family if they are close by.
We also mentor three different groups of young birders, and they go out to the refuge regularly and observe the cranes.
Q. And when you're doing --
THE COURT: Is your club listed in the phone book?
THE WITNESS: It's my phone number, but we're listed -- you know, we have a website. And if you e-mail that website, it pops to my e-mail address.
THE COURT: Okay. Thank you.
BY MR. KAHNE:
Q. When you're out doing the surveys, you've mentioned that sometimes you see one or two, and that would be a good thing, right?

A. Yes.
Q. And if, for some reason, you didn't see any cranes when you were doing your monthly survey, how would you characterize that?
A. Terrible. And you know, it's happened a couple of times. They're just, probably from the tower they've moved around. But we count on seeing the cranes.
Q. You mentioned the, your field trips. You chartered a boat for that?
A. Uh-huh.
Q. Okay. And then who goes on those field trips? Is it only members of the club?
A. No. Field trips are open to the public. We usually can take about 35 to 40 people on the boat. People will call from all over this area or from far away and ask to get on the list and want to pay, so we usually have a wide assortment types.
Q. What kind of activities do the people who are on this tour do with respect to the cranes?
A. Well, usually -- and sometimes it practically becomes comical, because perhaps out of 35 people, you know, 18 have scopes, spotting scopes. So we set up scopes on the top. We, you know, we -- they go slow and they anchor near where the whooping crane families are.
So photographers are taking photos. People are looking through spotting scopes. People have been known to draw.

People are just enjoying the day. It's -- we usually, it's like a four-hour trip.

Q. And did you say how many people are typically on the trips?

A. When we charter, we don't try to have more than 40 people, 35 or 40.

Q. Now, as part of the trips that you've done and that the club has done to the refuge, have you and other members of the club come to know some of the individual cranes and their families?

A. Yes.

Q. And for example?

A. Well, as we, as you go on the boat and you're traveling through the refuge, you expect to see certain family groups. And you know, we might comment, "Oh, look, they've got, you know, two chicks this year, not just one." Or "Where are the Lobstick family? Oh, there they are." You know, so we do, we do recognize the family groups.

Q. How would it hurt your personal activities and the club's activities if all of the cranes were to die?

A. Well, it would be devastating. There would not be any activity as far as our group going to the refuge. On our boats, we usually have people from other countries, and sometimes they don't speak English. And they, you know, you don't need words when you see a majestic whooping crane. And

you can just see it in their face. And if we didn't have that, it would, it would be very sad.

Q. And how would it hurt your activities and the club's activities if some but not all of the cranes died?

A. It would also, it would hurt us tremendously because, for one thing, if they were --

THE COURT: You mean a percentage drop?

MR. KAHNE: I'm sorry?

THE COURT: I mean, some are going to die all the time.

THE WITNESS: Right.

THE COURT: So you're talking about a percentage drop.

THE WITNESS: Right. That's what I --

MR. KAHNE: Well --

THE WITNESS: -- I thought he meant, like if there were fewer.

BY MR. KAHNE:

Q. Well, I think it's even, even if they die normally, it hurts. But the more that die, is it true that the more that die, the worse it is?

A. Well, if there were fewer, it would be harder to see the birds. And they would probably spread out and you would not be able to, to see them. So it would hurt if there were fewer, to observe them.

Q. Right. And what's your understanding of the numbers of cranes returning to the refuge this year?
A. Just what I've read in the paper, about 300 birds.
Q. And might that be the largest number of cranes in quite a number of years?
A. Yes.
Q. Even with this larger number of cranes, is it still true that the -- that you and the Aransas Bird and Nature Club are still hurt if some of this larger number of birds were to die?
A. Yes.
Q. And why is that?
A. Well, we would not -- we've kind of become invested in these family groups also, and you know, we would be devastated if we couldn't see these cranes. You know, they're kind of prehistoric. It's kind of our touch tone to the past.

MR. KAHNE: Okay. I have no further questions.

THE COURT: Thank you.

CROSS-EXAMINATION

BY MS. SNAPKA:
Q. Good afternoon, Ms. Corpora.
A. Hello.
Q. You said you moved down here in 2004. Is that correct?
A. Correct.
Q. All right. And when did you become the president of the Aransas Bird and Nature Club?

A. This is my third year as president, so I don't know. Three terms ago, like 2009, 2010. Either 2008 or 2009.
Q. 2008 or 2009?
A. Uh-huh.
Q. Tell me about the activities of the Aransas Bird and Nature Club with regard to habitat acquisition. What do you mean by "habitat acquisition"?
A. That is, on the local level we are, we facilitate and act as advisers to local Rockport, Aransas County group right now, called Aransas Pathways. We are in the process of identifying some wildlife areas, and the county is in the process of purchasing them. We are not providing money to purchase. We are advising.
Q. Tell me about the nature of that advice.
A. Uh-huh.
Q. Am I correct in assuming that the more protected habitat there is, the better it is for the whooping cranes?
A. This is not about whooping crane habitat. You were -- with our bird --
THE COURT: She's talking about other things.
THE WITNESS: Other things.
BY MS. SNAPKA:
Q. Okay.
A. This is in, more in the Rockport city area.
Q. Okay.

A. And the whooping crane refuge, even though it's in Aransas County, is out --

THE COURT: It's shore birds, other shore birds, those kind of things?

THE WITNESS: Right. Right. And we're interested just in protecting some areas that, so that they're not developed.

MS. SNAPKA: Okay.

THE WITNESS: Okay. So it's a combination --

THE COURT: Do you have like oyster catchers over there that --

THE WITNESS: Right.

THE COURT: -- with breeding grounds --

THE WITNESS: Right.

THE COURT: -- that need to be preserved and --

THE WITNESS: That's correct.

THE COURT: That's what she's talking about. That's what I understood.

MS. SNAPKA: I understand. And there's a reason for --

THE COURT: Okay.

MS. SNAPKA: -- asking the question.

THE COURT: I know. I'm sure.

BY MS. SNAPKA:

Q. Would increased habitat, in other words, protecting

additional habitat, have a beneficial effect on the whooping cranes? Or it doesn't have any effect?

A. Well, in -- certainly down the Matagorda, St. Charles Bay, Lamar, Welder Flats, all of that area needs protecting. And the more that they can get conservation easements for, the better.

In the Rockport area where we're working, we're not going to have any whooping cranes come to the areas where we're looking at.

THE COURT: It's a different habitat, is what you're saying.

THE WITNESS: It's a totally different habitat.

MS. SNAPKA: Right. Okay.

THE COURT: It's not contiguous to the whooping crane habitat.

THE WITNESS: That's right.

THE COURT: But it would extend their boundaries. It's a different habitat.

THE WITNESS: That's right.

THE COURT: Sorry to answer the questions for you.

MS. SNAPKA: That's quite all right. Oso Bay is not contiguous either, but --

THE WITNESS: I know.

MS. SNAPKA: -- sometimes they show up.

THE COURT: Well, I know, but that's a rare thing.

BY MS. SNAPKA:
Q. Now, with regard to you in particular --
A. Uh-huh.
Q. -- what you said is that you really enjoy the whooping cranes, and you moved here --
A. Uh-huh.
Q. -- to bird. Is that correct?
A. Correct.
Q. All right. You don't own any businesses that rely upon whooping cranes. Is that correct?
A. No, I do not.
Q. So you've suffered no economic injury. Is that correct?
A. That's correct.
Q. Since you've been here since 2004, you've gone out every year, either by car or by boat, to see the whooping cranes?
A. Yes. Yes.
Q. And if I understood your testimony correctly, from time to time there were trips where I think you said because of cranes moving around, you might not see one on a particular trip. Is that right?
A. Only from the tower.
Q. Okay.
A. The land trips. If you're going by boat, you're going to see the whooping cranes in the habitat.
Q. Is that true for every winter that you went out since --

A. Absolutely.
Q. I'm sorry?
A. Yes.
Q. You've seen them every winter since 2004?
A. Multiple ones, like you know, you do see them on the boat. They are closer to the water.
Q. So you've been able to enjoy them every year since 2004?
A. Uh-huh. Yes.
Q. Good. Now, you were asked a question by Counsel if all of the cranes were to die -- clearly that would be devastating, wouldn't it?
A. Uh-huh. Yes.
Q. Do you have any reasonable expectation that all of the cranes are going to die, that some sort of an entire die-off is imminent?
A. Imminent? There could be, you know -- I have no idea. I don't know if it's imminent or not. I worry that there could be catastrophes of other sorts, in the ship channel or the drought continuing or the water flow. I do worry, you know, about that.
Q. But as you sit here today, there's --
A. I have no knowledge of any --
THE COURT: I disregard that whole question anyway.
THE WITNESS: Okay.
THE COURT: So you don't have to go there.

MS. SNAPKA: Okay.

BY MS. SNAPKA:

Q. With regard to the, specifically with regard to the '08-'09 season --

A. Uh-huh.

Q. -- were you able, every time you went out on a boat, were you able to see whooping cranes?

A. Yes. But I do remember that that year was the only year during the entire January and February when we were out in the boats that we only observed an adult catching one blue crab. And because, I remember it because -- instead of multiple -- in past years, we had seen multiple, because the entire boat cheered. And there were photographs of it. Because it's very spectacular to watch. And then to see the adult share it.

Q. And that was what, you were able to observe that during the --

A. We were able to observe -- and I remember that was in like late February of 2009, because we had a group out there on a boat, and people got photos.

But that was, that is my, one of my main memories of that year, because I was not -- you know, I'm not a biologist, or I'm not involved in like weekly mortality rates. I, we just get the reports from the refuge and read. So really, as a layperson, we didn't really know what was going on. All we knew is we did not see the whooping cranes catching lots of

crabs that we were witnessing and feeding them.

THE COURT: Do you have your own boat?

THE WITNESS: No.

THE COURT: Okay.

THE WITNESS: But we charter and we, I go with neighbors and --

THE COURT: Okay. So you can charter your own boat?

THE WITNESS: We charter a boat. The club will charter a boat.

THE COURT: Okay.

THE WITNESS: And, you know, say we have so many birders that would like to go on it, and then we set that up in advance.

THE COURT: Thank you.

BY MS. SNAPKA:

Q. And so other than a general concern that there may be some sort of a drop in the population of cranes, that's just, that's a concern that we all have for any endangered species. Is that right?

A. Correct.

Q. Nothing specific to the whooping cranes.

A. That's correct.

MS. SNAPKA: Thank you.

THE COURT: Anything further? Thank you, ma'am. You're excused.

THE WITNESS: Thank you.

THE COURT: Call your next witness.

MR. BLACKBURN: I call Dr. Paul Montagna.

PAUL MONTAGNA, PLAINTIFF'S WITNESS NO. 7, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. For the record, would you state your name, please?

A. Paul Montagna.

Q. And how do you spell Montagna?

A. M-O-N-T-A-G-N-A.

Q. And where do you live, Dr. Montagna?

A. I live in Port Aransas, Texas.

Q. And how are you currently employed?

A. I have actually three titles. I'm the Endowed Chair for Ecosystems Studies and Modeling at the Harte Research Institute at Texas A&M University-Corpus Christi. I'm also a professor in the Department of Physical and Environmental Sciences, and I'm also the Coordinator for the Coastal and Marine System Science Doctoral Program.

Q. Is that also --

THE COURT: Okay, the third one is -- have you put this on an exhibit?

MR. BLACKBURN: It is. Would you pull up Exhibit 258.

THE COURT: Okay.

MR. BLACKBURN: All of this will be on Exhibit 258, and I'm just going to get him to summarize it, but the resumé is in the record.

You want to go back just a little bit? There you go. And we'll just go through -- Your Honor, would you rather read it, or would you rather hear it?

THE COURT: Either way you want. I just wanted to be able -- I was writing it down. I probably didn't need to write it down if it's on an exhibit.

MR. BLACKBURN: No, Exhibit 258 will have all of this. I'm just going to summarize it.

THE COURT: Thank you. Go right ahead.

BY MR. BLACKBURN:

Q. Would you briefly summarize your educational background.

A. Yes. I got a bachelor's degree from State University of New York at Stony Brook, a master's degree from Northeastern University, a Ph.D. from the University of South Carolina, and I performed post-doctoral studies at the Lawrence Livermore National Laboratory in California.

Q. And would you kind of briefly summarize where you've worked and how you worked your way through the university system?

A. After my Ph.D., my first job was as a post-doctoral research associate at the Lawrence Livermore lab, as I mentioned. And then in 1986, I became assistant professor,

assistant professor and a research scientist at the University of Texas Marine Science Institute in Port Aransas. I worked there till about 2006, and in the fall of 2006 I moved to Harte Research Institute at Texas A&M-Corpus Christi.

Q. And that's where you are today?

A. Yes.

Q. Now, when I was making my opening statement, I happened to mention the Harte Institute, and Your Honor sort of questioned something about oil spill work at Harte Research. Are you involved with oil spill research at the Harte Institute?

A. Yes, I am. My -- in my career, I've done, I've worked on primarily two areas, offshore oil and gas and deep sea ecology and also estuarine research related to fresh water inflow. And right now, I am the primary technical lead for doing the deep sea assessment for NOAA on the oil spill that occurred last year.

Q. And are you basically leading the natural resource damage assessment that's going on at NOAA?

A. Yes, for the deep sea biology.

Q. And basically have you, are you kind of tied to a confidentiality agreement and really can't discuss that work at this time?

A. Yes, it's --

THE COURT: What work?

THE WITNESS: Yes.

THE COURT: What work?

MR. BLACKBURN: The work that he's doing for National Oceanic and Atmospheric Administration.

THE COURT: I don't care.

MR. BLACKBURN: I thought you might. But --

BY MR. BLACKBURN:

Q. So what you don't have a confidentiality agreement about, could you tell us about your work on bays and estuaries on the Texas Coast?

A. Yes. When I first moved to Texas in the summer of 1986, I was approached by Jerry Powell at the Texas Water Development Board. And of course, in 1985, the State of Texas passed the environmental flow rule, and the water board was charged with trying to determine what the fresh water inflow needs were of various bays and estuaries in the state. And he asked if we could help perform studies in Nueces, Corpus Christi Bay and San Antonio Bay to try and determine the fresh water inflow needs of those bays.

And frankly, ever since that first experience, it's essentially taken over, this particular topic has taken over my career. And at this point, I've worked in just about every bay in Texas. I've worked in Florida, I've worked in Morocco, I've worked in Japan, all over the world on this one particular issue now.

THE COURT: Are you, are you an expert in that BP

case, the oil case, the oil spill case?

THE WITNESS: Yes.

THE COURT: For whom?

THE WITNESS: I'm working for the Government, for the National Oceanic and Atmospheric Administration.

THE COURT: And what are they doing? What is their capacity exactly? Do you know?

THE WITNESS: Well, yes. You know, there's the, the Oil Pollution Act of 1990 created the National Resource Damage Assessment Process. And through that, NOAA has a responsibility to assess any damage and to come up with a recovery and restoration plan.

And because the blowout happened in the deep sea, there's a lot of concern about what's going on at the deep sea bottom. And that's another one of my areas of expertise. That's actually what I started working on back in the '70s. And my post-doctoral also at the Lawrence Livermore Lab was all about oil seeps and oil spills.

So I've got these two expertise in my background, one on offshore oil and gas and oil spills and oil seeps, and then I have this other expertise in fresh water inflow and estuarine resources.

THE COURT: Okay. So I heard wrong. The Harte Institute is lending its expertise to evaluate in the oil spill of the BP --

THE WITNESS: Yes.

THE COURT: Okay. And to come up with a remediation plan, if any? Or at least assess the damage, if any.

THE WITNESS: Assess the damage is more accurate.

THE COURT: Okay.

THE WITNESS: Yes.

BY MR. BLACKBURN:

Q. So you might be an expert witness in another case in the future.

A. Yes.

THE COURT: Apparently.

THE WITNESS: Apparently.

BY MR. BLACKBURN:

Q. Unless something happened to settle.

A. Yes.

Q. With regard to the estuaries of the Texas Coast, would you, have you worked in all of the estuaries?

A. Um.

Q. First of all --

A. Yes.

Q. First of all, what is an estuary?

A. An estuary is a semi-enclosed body of water, where fresh water and marine water mix. And so therefore, all the coastal zones, nearly all the coastal zones in the world are estuarine environments.

Along the Texas coast, there are seven major estuarine systems. The one I've worked the least in is Sabine Lake. I've only worked -- I worked there maybe one year. Galveston Bay, we did about two years worth of studies.

THE COURT: Could people call that brackish water, I mean, mixed salt and fresh?

THE WITNESS: Yes. Yes.

THE COURT: Okay.

THE WITNESS: We actually have, there are actually several different categorizations. For example, we use words like oligohaline, mesohaline, polyhaline, meaning fresh, a little bit of salt, some more salt, and a lot of salt.

THE COURT: But there's always movement in this.

THE WITNESS: Yes, yes. The tide --

THE COURT: And some water, I guess, has no movement. It just sits there in a pond or --

THE WITNESS: Yes.

THE COURT: -- isolated.

THE WITNESS: Yes. And it's actually that movement and it's the mixing of the fresh water and the salt water that make estuaries the most productive environments on earth.

BY MR. BLACKBURN:

Q. Now, most productive in what sense? You say most productive on earth.

A. In terms of production of carbon.

MR. BLACKBURN: Could I have Exhibit 59, please?

BY MR. BLACKBURN:

Q. Now, we were talking about an estuary. Could you describe what's shown on this -- by the way, did you draw this up?

A. Yes. Actually, a student of mine is the artist here, and this was created for a report for the National Estuary Program when we were doing this, the original characterization work for the Corpus Christi Bay system.

And what I was trying to capture in this diagram is the geomorphological structure of estuaries on the Texas Coast. Now, it turns out in different parts of the world, depending on geology and particularly the amount of flow to the coast, estuaries can look very dramatically different.

What's interesting about the Texas Coast is that all the estuaries have a very similar shape. And also, we call these bar built estuaries, because you'll notice there's, you know, the beach is on a sand bar that's essentially separating the bay from the ocean.

And so now what we have at the top is a river flowing into a bay, a small bay, and then the ocean connected to a larger bay, called the primary bay. So we always refer to the bay closest to the ocean as the primary bay, and the bay in which the river flows into as the secondary bay.

And what I'm representing in this picture, too, is that there's a gradient in habitats. And so closer to the river, we

have more marsh habitats, oyster reefs. And away from the rivers, closer to the ocean, you'd have the beach habitats. That's where you'd find sea grass beds.

THE COURT: What's the number, again, of the exhibit?

MR. BLACKBURN: That is Exhibit, Plaintiff's Exhibit 59.

THE COURT: So in summary, I did not make you disclose anything about your work for NOAA.

THE WITNESS: Correct.

THE COURT: You keep your confidentiality agreement. Go ahead.

BY MR. BLACKBURN:

Q. Now, would you describe your research involvement with the Guadalupe Estuary, otherwise known as San Antonio Bay?

A. I first started working in San Antonio Bay in January 1987. As I said earlier, I moved here in '86 and quickly started to perform research on the effect of salinity and fresh water inflow on San Antonio Bay. And we actually have been sampling San Antonio Bay ever since -- we still sample it today.

Q. And among other things, does San Antonio Bay border the Aransas National Wildlife Refuge?

A. Yes, it does.

Q. And are you familiar with Matagorda Island and San Jose Island and some of the different geographic places that have

been described in the context of the habitats of the whooping crane?

A. Yes.

Q. And are you involved at all in, currently in bay and estuarine studies by the State of Texas?

A. Yes, quite a few. We -- I©m still working in San Antonio Bay, and that work is funded by the Texas Water Development Board. And I am also a member of the Science Advisory Committee for the environmental flow process in Texas, which is also called Senate Bill 3 process.

Q. So you are a participant in that Senate Bill 3 process as a, basically an expert scientific advisor. Is that fair?

A. Yes, exactly.

[redacted]

MR. TAYLOR: No objection, Your Honor.

THE COURT: Then he©ll be so accepted. Thank you. Is Sylvia Earle still associated with the program?

THE WITNESS: Yes, she is.

THE COURT: Okay. What©s her title there?

THE WITNESS: She is the Executive Director of -- the chairman of our advisory council.

THE COURT: Okay. Thanks.

BY MR. BLACKBURN:

Q. Now, in this conceptual diagram, which is Plaintiff's Exhibit 59, could you describe the role of fresh water inflow to this functioning estuary?

A. Yes. The most important thing about fresh water inflow is, is actually the definition of an estuary itself. When you asked me what an estuary is, I told you it's the area where fresh water and sea water mix. And so that means there's also a gradient from the top of this particular picture where the river enters, you'd have very low salinities, and of course more, higher salinities toward the bottom of the picture, toward the ocean.

And it's exactly that salinity gradient that sets up across a bay that provides the elements of the environment that support the communities and the organisms there. And that's the term, that's the definition essentially of a habitat. So what we have in bays are a series of linked habitats.

MR. BLACKBURN: Okay. Exhibit 60, please.

BY MR. BLACKBURN:

Q. So in terms of the inflow, if inflow is diverted, are there impacts to an estuarine system?

A. Yes. And this is another conceptual model, or cartoon, if you will, that we developed to try and explain the effect of both water demand by, by cities, by agriculture, and that typically is associated with a diversion created by either an impoundment, such as a dam. And of course, when you build a

dam across a river, what we're -- the whole purpose is to create a water supply. And you create the water supply by, by keeping water not in the river but, you know, in a reservoir.

Now, when that happens, water flow to the coast is diluted, and therefore the dilution power -- excuse me -- water flow to the coast is decreased. And so the dilution power of the rain water is lowered. And typically what we see is increases in salinity.

Now, there are two other important details about water flowing to the coast, and that is that fresh water is draining the watershed. And so therefore, there are two other important material components. One is the dissolved nutrients and organic matter that would flow into a bay, and the second thing are the sediments.

And so what happens is sediments get trapped behind dams, and we have less buildup of sedimentation in the marshes, and that could actually cause erosion rates to increase.

The second thing is the nutrients. We're actually seeing evidence of increased -- excuse me -- of loss of nutrients because we have less flow. So as you have less flow, you have less delivery power of the nutrients themselves.

MR. BLACKBURN: And could I have Exhibit 61, please.

BY MR. BLACKBURN:

Q. Now, Exhibit 61 is also a diagram, I think it's from, by Palmer et al., but you recommended to me that this is something

that's illustrative of what goes on in the system. Could you explain it, please?

A. Yes. This is what I like to call our conceptual model of inflow effects. And the interesting thing about this is that it took us nearly 20 years to figure just this part out. I told you I started working in 2000 -- in 1986 on inflow issues.

And you'll see a very similar picture in the SAC, the Science Advisory Committee guidance on how to develop inflow methodology.

Q. Wait, let me just stop you. When you say SAC, because I know you're going to say it in the future, that's the Science Advisory Committee that you are a member of. Is that correct?

A. Right. They have a -- in their guidance documents, which I was a co-author, we have a similar diagram. Let me -- and Palmer, by the way, works for me. So I was a co-author of this as well. And you'll see, it says, "Modified by Alber, Alber 2002." This was first put together by Merle Alber at a conference that I convened and later edited a volume of papers on.

And the conceptualization here is very simple. The idea is that fresh water inflow doesn't affect estuarine resources directly. What fresh water inflow does is it change -- it creates the estuary conditions in the context of salinity, sediments, dissolved materials, the nutrients, organic matter, and also particulate matters.

And the biology, the estuarine resources actually responds to the estuary conditions. And the estuary conditions are set up by fresh water inflow. And what --

Q. So -- I'm sorry, go ahead.

A. I was just going to say, the main way in which this diagram is different from that original Alber representation like this is we've simply added a lot more detail in what we mean by these three components.

Q. So is it fair to say that fresh water inflow is almost a defining variable in terms of the way in which habitats are found within the estuarine system?

A. Yes.

Q. Now, could you explain to Judge Jack what's meant by the term "habitat"?

A. A formal biological definition of "habitat" is the elements of an environment that supports a species or a community of organisms. And one interesting thing about that is what we call foundation species, for example, oysters. So oysters require certain salinity conditions and certain conditions in terms of phytoplankton in the water column for them to feed on. But when oysters grow and build reefs, the reefs themselves become habitats.

So some organisms not only utilize a habitat but also start to create habitat by themselves. And when an organism can do that, we call that a foundation species. And the three

best examples in the Texas zone are oyster reefs, marshes, and sea grass beds.

MR. BLACKBURN: Now, would you please raise Exhibit 63. There. And could you tighten in on the Texas Coast portion of that, please. There we go.

BY MR. BLACKBURN:

Q. You mentioned several estuaries. And just to take us quickly, could you carry us down the Texas Coast from the Sabine?

A. Right. Well, after Sabine, we have the Galveston Bay system. Then we have this real interesting part of the middle Texas Coast, which is the Matagorda Bay system, Lavaca-Colorado Estuary. San Antonio Bay system we refer to as the Guadalupe Estuary.

Q. Let me stop you right there. Would you explain why sometimes you hear it called San Antonio Bay and sometimes the Guadalupe Estuary?

A. Yeah, that's a real good question. When we name things in a formal geographic way, an estuary should be named for its river source, because the estuary is defined as where the river meets the sea.

And so, for example, the river that flows into San Antonio Bay is the Guadalupe River. And so I always refer to that area as the Guadalupe Estuary. And when I use that term, I mean essentially the river mouth all the way out to the pass.

What's interesting is, is if you look -- and by the way, this is a figure from the Texas Water Development Board, and they use that same convention in naming these coastal systems. But if you look at federal documents, particularly all of the documents put out by NOAA, they will refer to these things by the primary bay name. And so they would refer to it as the San Antonio Bay System.

And the one just north of that, it's labeled Lavaca-Colorado Estuary because the main rivers flowing into it are the Lavaca River and the Colorado River. NOAA would refer to that as the Matagorda Bay System.

So I've worked -- if you look at those four that are linked together, Lavaca-Colorado, Guadalupe, Aransas and Nueces, what's interesting about them is they're all linked together by lagoons. And so these are all -- and also notice the curve of the coast there.

And so these act as a functioning unit. And we refer to them as the Coastal Bend bay -- Coastal Bend estuaries as well. And I've worked in every single one of those in Laguna Madre rather extensively, again since '87, '88.

Q. Now, I'd like to ask you, I guess it's just --

THE COURT: Is this the witness that's going to tell me about life in the Nueces Bay?

MR. BLACKBURN: That's -- he is exactly the --

THE COURT: Is there any?

THE WITNESS: Not a lot any more. It's very interesting. We just -- I was part, I was part of a team that helped write the Estuary Report for Nueces Bay for the Senate Bill 3 process. I was also assigned to Nueces Bay as the SAC observer and facilitator.

And it is the only bay in Texas, Nueces Bay in particular I'm talking about, where the -- I'm going to use another acronym, BBEST. That stands for Basin and Bay Expert Science Team. So as part of this whole Senate Bill 3 process, a BBEST is supposed to come up with an environmental flow recommendation for the system. And then there's a lot more other things that happen after that.

So the, what the BBEST is supposed to do is determine the, essentially the fresh water inflow needed to sustain the ecological environment, and without regard to water needs by human beings. That's the, that's what statute says the BBEST is supposed to do.

And so one of the first things that you have to do to determine the water need is to determine the state of the environment. And whereas every other system started out, every other BBEST team started out saying they have a sound ecological environment today, the Nueces BBEST team came to the conclusion that Nueces Bay is not a sound ecological environment.

And that is based on, not ancient history, but recent

history. Basically that group only looked back into the 1900s. There was not a -- I would characterize it as it wasn't an extreme view. They weren't trying to compare the conditions today to, you know, prehistoric times or time when people weren't around, but more toward a time in which very large changes were occurring, and in particular, it's related to the mining of oyster shell and the over-fishing of oysters, and of course construction of the two reservoirs, which has reduced inflow dramatically.

So the Nueces River, even -- excuse me, Nueces Bay and the marshes surrounding Nueces Delta were very low salinity zones, very productive zones up until the 1930s. And since then, things have changed dramatically.

And today, in fact, in fact right this minute, the salinity in Nueces Bay, parts of Nueces Bay is up to 45 parts per thousand, which is 50 percent greater than sea water. And that's because of the drought. But obviously it's because water can't reach the bay any more.

THE COURT: Because of Choke Canyon, I guess?

THE WITNESS: Well, because of -- right, because of the two systems, the two dams. Exactly.

THE COURT: So can anything be done about that?

THE WITNESS: That's a good question, too. Well, you know, the process is not finished. This Senate Bill 3 has two -- the next thing that happens is there's a stakeholder

group that will take the science recommendations, form their own recommendations. Both the stakeholder and the science team recommendations go to TCEQ, and then TCEQ makes a rule. So that whole process will take another year or so to play out.

And then after TCEQ makes a rule, there's supposed to be the creation of an adaptive management plan. And the statute specifically says that if you don't have enough water, you've got to figure out a way to get some more. Now, exactly how that's going to happen is totally unknown territory.

So my hope is that once we understand what the need is for both people and the environment -- there has to be water for people as well -- but once we understand the full need for people and the environment, we figure out a way to provide for both. And one particular -- you know, well, I can go on for hours. I should stop there.

BY MR. BLACKBURN:

Q. Just let me ask you one thing. Isn't it part of the Senate Bill 3 process that all existing permits are essentially grandfathered?

A. Yes.

Q. So you've got, whatever gets done has to work with whatever's left over. Is that fair to say?

A. That's my understanding.

Q. But yet you scientists are asked to try to figure out how much is needed without regard to that, but the process cuts off

that need at the amount that's already been allocated. Is that fair?

A. Yes.

THE COURT: Is that fair, though?

THE WITNESS: Is it fair?

MR. BLACKBURN: Well, I was asking if it was a fair description.

THE COURT: Oh, I know, but I meant is that going to work?

THE WITNESS: I think we have to make it work somehow. You know, the reality is, is scientists today like to refer to the current period of time as the anthropomorphosing, trying to make a play on the fact that human beings are now so embedded in the landscape that we've completely altered the earth. And you know, climate change is real. We've changed the amount of CO2 in the environment. And we've completely changed the water cycle.

Today only half of the water on earth is actually in the natural environment. It's behind -- the other half is behind reservoirs. So that's what I mean by we've changed the water cycle.

And the reality is people are here. People are not going to go away. People have needs. And we really need to figure out how to coexist in the environment. And that's -- I'm getting a little bit into personal philosophies. What my

personal philosophy is, that there's been a false choice, that you have to choose the environment or people. I don't believe that's true. I think we can figure out ways to do both.

THE COURT: Well, I guess my fair question went to the grandfathering in all the --

THE WITNESS: Oh.

THE COURT: -- present permits.

THE WITNESS: That's the legislature's decision. I don't --

THE COURT: Actually, it may not. I mean, I think that's what they're asking me to do.

MR. BLACKBURN: We're asking the Judge to do something. If you were the --

BY MR. BLACKBURN:

Q. Might I ask, if you, if it were your choice, would you grandfather everything?

A. I'm not sure there's a need to. I mean, I'm getting out of my area of expertise, but I do know this, there are more water rights granted than are currently being used.

And the other thing that's changing dramatically right now, of course, is the urbanization of the state. Particularly Texas is a good example of that. And so whereas agriculture needs one level of water, cities need a different level. So things change. Landscapes change.

Q. Do you think, for example, we could figure out how to be

more efficient in our water use as a state?
A. Yeah, I do.
Q. And these are the types of things you're talking about being able to work these things together. If there were some force to make that happen, do you think it could happen?
A. Yes. I'll give you one perfect example. You know, there are -- one place where I did a little bit of -- I didn't go there, but I worked with people from South Africa. They have a very interesting law. They think that human beings only require about 25 liters of water a day. You know, in the U.S., we use about 125 gallons per day, which is almost four liters, which is, you know, about four liters per gallon, I'd say.

So the bottom line is we have a rather prolificate use of water, which is fine in areas that have a lot of water. But in drier areas, it's, we're going to have conflicts, like we see today.

So there's a lot we can do in terms of conservation. We really don't work very hard at it. In fact, San Antonio is one of the few places in the country that does well. Does a lot better than other places do.

Q. Now, back to Nueces Bay, what's the highest salinity that you've heard of in Nueces Bay?
A. In the bay itself, about 45 parts per thousand.
Q. And is there a kind of evidence from the fossil record, from the record of the shells and things like that that you

find there as to whether it historically was up at 45 parts per thousand?

A. There is some real interesting evidence. We've done a lot of studies in the marshes surrounding the bay. And in fact, from those marshes we've seen salinities as high as 200 parts per thousand, which is an amazing number. That's essentially a salt factory.

And what's interesting, though, is as we walk along the marshes there, we find piles of this small clam called rangia. It's actually not that small. It's about 10, 20 centimeters across, a couple of inches across.

Now, what's interesting about rangia is, while the piles are middens -- these are where the Indians used to collect the shells and collect the mollusks and eat them. But what's interesting about rangia is they require salinities from 0 to 10 parts per thousand. And so that's indication --

THE COURT: How do you spell that?

THE WITNESS: Rangia is R-A-N-G-I-A.

THE COURT: Thank you.

THE WITNESS: And the fact that we find huge piles of large rangia in that area meant it was once an area that had very low salinities. And of course that's not the case at all today.

BY MR. BLACKBURN:

Q. And just from the standpoint of your understanding of the

system and the water management, would it be fair to say that human water management killed the Nueces Bay estuary?

A. Yes.

Q. Now --

THE COURT: So is the Coastal Bend Bays and Estuaries doing anything at all to help that?

THE WITNESS: Yes. Yes. We've -- I say we, because I've participated in projects with them. I think that's the main reason why they are striving to try and put much of the Nueces Delta in conservation. You may be aware that they've bought some land there. They're trying to buy a lot more.

THE COURT: I am.

THE WITNESS: And -- I know you are. And the whole goal is to -- and the other thing we've done, in cooperation with the City of Corpus Christi, is we actually have a pipeline now that diverts water directly into the marsh. And there's small volumes, and of course, you know, it gets complicated with the way the water system's operated the way the current rules are. But we're trying. We're trying to restore the marsh by putting more water into the marsh directly.

There are two, one other large project that's actually underway right now that I'm also a part of, and that is what's called the Feasibility Study by the U.S. Army Corps of Engineers. And they're looking for an opportunity to create a, essentially a restoration program, and they're looking

seriously at trying to, you know, do some more restoration in the marsh.

So basically since about 1994, we have slowly been trying to do projects to, you know, increase the water availability to the marsh and kind of replumbing the system, working with the, with TCEQ on the rules, and it's, you know, it is what it is.

What I mean by that is that some positive benefits have occurred, but the, the system is not going to be able to grow rangia again under its current conditions. Nueces Bay, with salinities of 45 parts per thousand, is not going to be able to build oysters again, not when our salinities get that high for that long period of time.

THE COURT: It will be in the bottom forever, huh? For a long time?

THE WITNESS: Yes.

BY MR. BLACKBURN:

Q. Now --

THE COURT: So you're worried this is going to happen to San Antonio Bay?

THE WITNESS: Yes, I have that concern. I mean, if we build large enough reservoirs to divert enormous volumes of water, then the bay water will not be diluted with fresh water. And you can see the same consequence --

THE COURT: And when you're talking about reservoirs,

are you talking about permits to -- I think I have a case that has to do something about permits, water permits to a nuclear power plant --

MR. BLACKBURN: This case?

THE COURT: Not this one, but another case. Is this case that --

MR. BLACKBURN: This is that case.

THE COURT: Okay.

MR. BLACKBURN: There is --

THE COURT: I thought I had another one up with some ranchers.

MR. BLACKBURN: I think this would be a similar case.

THE COURT: Okay.

MR. BLACKBURN: And I mean, you will hear at some point that members of The Aransas Project include the O'Connor family. And there is concern about use of allocated but -- permitted but currently unclaimed water that is currently at least available to the bay system. And we'll have evidence about that.

THE COURT: Okay. Is that right?

THE WITNESS: I don't know.

MR. BLACKBURN: It's another expert that's going to be presenting the technical analysis of that.

THE COURT: This case is that old that my memory is going so quickly, or I'm so old.

MR. BLACKBURN: It actually is, this case has been around a bit.

(Court and Clerk conferring off the record.)

THE COURT: It's another one. Yeah, I have another one.

MR. BLACKBURN: Oh, you do?

THE COURT: I do.

MR. BLACKBURN: Okay. I mean, there are similarities.

THE COURT: Oh, huge.

BY MR. BLACKBURN:

Q. Okay. The -- what I want to ask about a bit is that, you know, so on the one hand, is there still a chance to save San Antonio Bay, in your opinion?

A. Well, yes, because San Antonio Bay is in pretty good condition today.

Q. Would it be fair to say that during times of water shortages, it does bad, and then it can rebound with better years?

A. Yes.

Q. And do you think that those bad years are made worse by water use by humans?

A. Well, that's our, really our real challenge, I think. Obviously the amount of rain you get from year to year varies. We have wet years, we have dry years. That's natural. And

obviously the systems -- and when I say "the systems," I mean, you know, particularly the organisms that live in the ecosystems -- have a certain ability to deal with that variability. They're adapted to live in a highly variable environment. And estuaries are highly variable environments because of the interaction of fresh water flow, tides, et cetera, et cetera.

So, you know, droughts, droughts are normal. Droughts are natural. Things are adapted to live in those conditions. However, the real challenge becomes what happens when it gets completely turned off. And we have the ability to capture just about all the water, if we wanted to.

And when we divert a lot of water -- the problem with diversions is that they need to be constant. If you're going to supply people or industry or agriculture, they're going to expect a constant diversion rate. Well, what happens during a drought? That still comes out. And so what gets to the bay winds up being a really tiny number.

Q. And --

THE COURT: So you think during a drought that everybody should suffer equally? That the fresh water should be reduced upstream, so that the endangered species still get their --

THE WITNESS: Yeah, you know --

THE COURT: -- sustainable amount?

THE WITNESS: Earlier on I mentioned we have to learn how to live together. And that's a good example of things that would be very easy. Again, Corpus Christi's a great example. We, we -- the way the rules are now, we don't really impose any restrictions on things like watering your lawn and washing your car until the reservoir gets down to 40 percent. You know, does it really have to be that low?

MR. BLACKBURN: Your Honor, might we take our mid-afternoon break?

THE COURT: Oh, I'm sorry. You always have to remind me. Thank you.

(Recess from 3:07 p.m. to 3:24 p.m.)

THE COURT: Be seated. Thank you. The heater is off in the building. They're fixing it. So just bring blankets, bring blankets till it's fixed.

MR. BLACKBURN: We were all kind of wondering about that.

THE COURT: I wasn't going to tell you till there was a complaint.

MR. BLACKBURN: I figure I've got one whine coming. I was going to save it for a while.

THE COURT: Go ahead.

BY MR. BLACKBURN:

Q. Okay. Dr. Montagna, we were, I think, basically discussing Nueces Bays and certain of the water management

concepts. And what I'd like to do is talk a bit about San Antonio Bay specifically, and talk a bit about salinity. I mean, we've talked a little bit about salinity gradients, but is there a range of salinity that's of particular importance in an estuarine system?

A. Yes. And actually, the Judge used the word earlier, "brackish." By brackish -- there's something about those middle salinity ranges, somewhere between 15, 20, 25 that seem to be the sweet spot for estuaries. And what's really important is the distance over which that gradient exists.

And one of the things that's unique about San Antonio Bay is that that brackish water gradient, it can -- it usually extends across the length of the entire bay. So what that means is that the entire bay winds up being an especially productive habitat.

Q. And so there's been some talk about parts per thousand. And by the way, we may see terms interused, parts per thousand and PSU. And I've been told they're sort of functionally the same, but not exactly. For our purposes, are they interchangeable?

A. Yes. For your purposes, they're interchangeable words. You know, we measure salinity in three different ways, essentially. And one way is either using an electronic device or refractometer, and the other way is to literally dry the water off and measure the total dissolved salts.

So a lot of people who are very technical about this want to use the word "parts per thousand" only when you're using the method where you've actually dried and measured the salt content. And when you use those other methods, like the refractometer or the electronic gauge meter is what we use all the time, salinity meter, we just call those "practical salinity units."

Q. And that's what --

A. But at the end of the day, you would have to go down to like, you know, fractions and fractions of a unit to find a difference. So for all practical purposes, we could use the terms interchangeably.

Q. Well, and the reason I ask that is there may be cause for the Judge later to be looking through reams of material and see 10 PPT and 10 PSU or 25 PPT and 25 PSU and wonder are those basically interchangeable.

A. Yes, they are.

Q. Now, in that range from, say, 15 to 25 parts per thousand, basically does the, do parts per -- does one part per thousand matter?

A. No. As I said, it's a range. And the other thing, of course, is that the systems are dynamic. You know, you've got changes in flow day to day, sometimes hour to hour depending on the rain. You've got changes in tide. And so what really happens is that these mixing zones essentially slosh back and

forth in the bay, both as the river runs a little stronger or the tide, tidal current runs a little stronger.

Q. So would it be then the geographic coverage of this range that's important?

A. Yes. And that, that's something I was alluding to earlier. It's real interesting. You know, again, getting the Nueces Bay example is good because it provides us a context with what we don't want to see happen here, and that is that if you, even when the river in Nueces Bay -- even when the Nueces River runs a little bit, when we've had a little bit of rain, you might get low salinity, but it might only be literally a couple hundred meters from the river distance. It doesn't extend the full length of the bay.

And what's different about San Antonio Bay today, of course, is that we can -- we find those salinity gradients over the entire length of the bay. What that means is that the area of the habitat's quite large. And one of the important ecological principles is that things like productivity, resilience to change is a function of habitat size. So the larger the habitat, the better it is for the system overall.

MR. BLACKBURN: Okay. Now, could I have Exhibit 68, please.

BY MR. BLACKBURN:

Q. Now, is it fair to say you know what is depicted in Plaintiff's Exhibit 68? Do you know that organism?

A. Yes. This is a, again, a conceptual model of the blue crab life cycle.
Q. And as an estuarine ecologist, are you familiar with most of the organisms that are in the estuarine system?
A. Yes, I am.
Q. Would you include the blue crab among those?
A. Yes.
Q. So could you describe what's shown on this diagram, in just somewhat simplistic terms?
A. It is, but what's interesting is that I created this diagram based on everything we know about blue crab life cycles. And by the way, an interesting point is that about 95 percent of all the commercial and recreational species have this exact same kind of a life cycle. So the things that people typically care about have this same kind of a life cycle. We call it estuarine dependent because they live part of their estuary -- they live part of their life cycle in the estuary.

And so what you see here, if we start all the way to the right, you'll see that the crab totally to the right has got a little black egg sac. And when we find eggs (sic) with eggs, we call them spongy eggs, by the way.
Q. Do you have a pointer up there with you?
A. Oh, yes. So --

THE COURT: The one out in the Gulf of Mexico.

THE WITNESS: I was, there's the Gulf of Mexico, and I was starting right over here. And you see a little black thing there?

THE COURT: I do.

THE WITNESS: Those are the eggs. So what happens is the females migrate to the higher salinity zones, and they release their eggs typically in the ocean, but they don't go very far out in the ocean. And in fact, that's common for lots of estuarine dependent species. You know, they don't have to go out ten miles to do this. They typically do this very close to a pass.

So you see, one of the important geographical features is that there be an open pass, which is a whole other story. And then the larvae that are released from the eggs go through several different stages, and they live primarily in the water column. And so at this point blue crabs are actually part of the plankton.

Now, as the tides come -- what they do, what the plankton do is they literally ride the tides in. They have behaviors that allow them to get up in the current and move into the bay when the tide is flooding, and they can actually move to the bottom or move out of the current when the tide is ebbing, so that they don't lose ground, so to speak. And eventually what happens is the smaller ones wind up in the fresher parts of the bay.

So you see, and they like to find marsh, they like to find edge, they like to find areas where there's lots of food, nutrients. And that's -- and the reason we call it a nursery is because that is where they will grow out. And then, of course, the life cycle starts all over again when the females get pregnant and start moving back offshore.

So two important things about this picture is it explains why blue crabs are found basically in all salinities, from zero to full strength ocean, and it also explains why that gradient I've talked about is so important, because if there isn't lower salinities up toward the river end of this picture, then there's literally no trail for them to follow up into the nursery habitats.

BY MR. BLACKBURN:

Q. What are the role of the marshes?

THE COURT: Okay, hold on just a second.

MR. BLACKBURN: Sorry.

THE COURT: Okay. Sorry.

BY MR. BLACKBURN:

Q. And let me ask you, you made a comment earlier about, you say about 95 percent of the marine species are estuarine dependent?

A. Recreational and commercially important species.

Q. So --

A. Things that people harvest.

Q. What would you include with that?
A. Oh, shrimp, redfish are a good example, believe it or not. Redfish actually spawn offshore as well. Their larvae have to find their ways into marshes and other kinds of habitats to grow.
Q. Flounder?
THE COURT: Lobster --
THE WITNESS: Well, not lobster. Lobster lives completely offshore all the time.
THE COURT: Yeah, okay. No --
THE WITNESS: They're purely ocean.
THE COURT: I know there are no fresh water, but there are some that live in a, up rivers in Maine, so --
THE WITNESS: Okay.
THE COURT: There's still salinity there.
THE WITNESS: Yes.
BY MR. BLACKBURN:
Q. If conditions are good for blue crab, would they also be beneficial for these other species?
A. Yes.
Q. Now, could you explain the role of marshes in the life cycle of blue crabs?
A. Yes. Marshes form what we call the nursery habitat, which makes about -- marshes provide two important things. One is a baby crab can literally hide from a marsh. Now, from the

crab's point of view, he does not want to be eaten by a whooping crane. He does not want to be eaten by a redfish. So they try and find some place where they can hide out, and we call that a refuge environment.

The second thing that's important about marshes is that the marshes are the most productive of all these productive habitats in terms of providing food. And so if you're a baby crab, the ideal place to go is a marsh, because there's plentiful food and you get the opportunity to hopefully survive a little longer because you can hide in the weeds literally.

Q. And with regard to salinity, are there -- apart from there being a gradient to follow in, is there a role of salinity in different life cycle times for a blue crab?

A. Yes. As I was saying, the young crab depend on a salinity gradient to literally lead them to the marsh and nursery areas and habitats. They literally follow the salinity gradient up into those marshes.

The other thing is, where would the --

THE COURT: You mean they go to the lower salinity?

THE WITNESS: To the lower salinity is what I meant.

The other thing that's important, too, is, you know, a crab can live two to five years. And so where, where do the males, for example, who don't have to migrate offshore, and where do they live normally? And what you'll find is that they have a preferred salinity zone of between about 15 and 20, 25

parts per thousand. So if you wanted to find a blue crab, you would have a higher likelihood of finding one in salinities in those ranges.

BY MR. BLACKBURN:

Q. Okay. Now, would you look at Exhibit 69, please. Now, this is a figure that you provided to me. Would you explain to Judge Jack what this graph shows?

A. Yes. What I did is obtained the data set from the Texas Parks and Wildlife Coastal Monitoring Program. We actually use it for a variety of purposes in the context of our fresh water inflow studies. And one thing, of course, the data set includes is information on blue crab abundance. This particular graph is from the abundance of blue crabs in trawls. And on the far left, I think it's 19 -- gosh --

Q. Like 1980?

A. 1980 or so? Yeah. And on the far right, I think it's 2009. And what you can see is there's been an incredible decline -- and this is, what I calculated here is the annual coast-wide average. So basically I took the average over the whole year over the entire Texas Coast, just to look at the long-term trend in blue crab. And what you can see is that there's a near linear decline in blue crabs over the last 20 to 30 years.

Q. Now, this is sort of the background of what's happening throughout the Texas Coast. Is that right?

A. Yes. And in fact, even further afield, we see similar trends on the East Coast, and in other gulf areas.

THE COURT: Is this over-fishing?

THE WITNESS: That's a real interesting question. I'm not -- a lot of people are spending a lot of time thinking about this, because blue crab is important fish, fishery.

THE COURT: Where do you find -- but do they, do you catch crabs with, in shrimp nets also?

THE WITNESS: Well, the commercial fishery is a pot, a trap. So they use the trawls to do a fisheries independent measurement of the status of the population. And of course they do that, you know, to provide for fishing regulations.

So as I said, what we know is that blue crab seem to be declining everywhere, and that's been going on for a long time. And there's no question that fishing plays one role. But in fact, as we have made fishing regulations more stringent, you can see the population hasn't rebounded.

And it's real interesting, if you look at graphs like this, for example, for redfish, you'd see the exact opposite. You would see that once they instituted very strict rules on take for redfish, the population bounced up within a few years.

So we think -- when I say "we," I really mean just me. This is Paul's personal opinion, is I think there's also a climate factor going on here, or some longer scale temporal dynamic that we haven't quite figured out yet.

But here's the really important point about this. We know that the blue crab abundances today are at historic lows, and that the blue crab populations themselves are highly threatened.

BY MR. BLACKBURN:

Q. So given that sort of long-term trend, if there is a fluctuation in salinities within a particular bay system, given this trend, is it more important or less important?

A. It would be critical. Again, you know, the management goal at some place like Parks and Wildlife and every other state wildlife agency is going to be to increase the blue crab populations. And hopefully they will enact rules that will, that should allow that to happen.

However, even if you completely stopped fishing altogether, if the habitats aren't conducive for their growth, they simply will not recover at all. And again we see the perfect example in Nueces Bay.

One of the things I am also doing is some oyster restoration programs, where we put more shell in the bay to provide habitat for oysters to settle on. But if the salinities aren't right, they just won't do it.

Now, there's two important things about salinity. I mentioned one already, which is that there's this preferred zone between about 10 to about 20 parts per thousand. The other thing that's really important about salinity is how

disease organisms all have a higher, all have a preference for higher salinities. Why, you know, why don't the males follow the females out toward the passes? Why do they stay up? Why do the median age groups who are not reproducing stay in the lower salinity parts of the bay? Well, the reason is is that it helps keeps down parasites. There are about five or six parasites of blue crabs. In fact, the same thing is true of oysters. We know this about a lot of shellfish now. They seem to need -- the parasites all love marine salinities. And that -- and so the, one of the reasons the blue crabs like lower salinities is it's a habitat where they will be less susceptible to disease.

THE COURT: You remember for a while, we heard about a lot of people getting parasites in the Gulf. Same kind of organisms? Same kind of parasites?

THE WITNESS: No, those are --

THE COURT: Some nasty thing.

THE WITNESS: Well, there's certainly vibrio, which is a bacteria.

THE COURT: Okay.

THE WITNESS: And that's a real big problem.

THE COURT: This was a parasite.

THE WITNESS: Yeah, I once saw a parasite go into someone's cut on their leg. You know how people fish in the jetties in Port Aransas?

THE COURT: Uh-huh.

THE WITNESS: Well one, they're full of barnacles, and it's real easy to scrape your leg. And I saw once where a worm literally burrowed into the guy's cut. So it was really nasty. Sorry for the side-bar.

THE COURT: That's too much information.

THE WITNESS: Sorry about that.

MR. BLACKBURN: You stick around Dr. Montagna for a while --

THE COURT: I know, I know.

MR. BLACKBURN: -- it's going to come.

BY MR. BLACKBURN:

Q. Now, there is -- so you were talking, when I was asking you about the role of, if you will, kind of maintaining salinity given this type of trend. Was it, I believe it was your statement that it is more important that these salinity ranges be maintained given these trends. Is that right?

A. Yes. For the blue crab population to bounce back, we're going to need two things. We're going to need effective fishing regulation, obviously, because -- that should be obvious why. And what the second thing is, is we're going to have to have habitat conditions, estuary conditions that are favorable for the population to grow.

And you know, this really gets back to the very first exhibit you put up, which was my conceptual model on how inflow

affects bay resources. I have the three boxes, Inflow Affects Condition, Condition Affects the Biological Resource. That one.

Q. That one?

A. That's exactly what we're trying to represent here, is that middle box. The estuary conditions have to be right for the estuarine resources to grow favorably.

Q. So if you were in charge of managing for blue crabs in San Antonio Bay, would you try to keep salinities 25 parts per thousand or lower over as much of the bay as you could?

A. Yes.

Q. And now was there an analysis of blue crabs that was conducted for the Nueces Bay Estuary study that used a technique called boosted regression trees?

A. Yes. This is very, very interesting. You know, one of the, one of the things that have been very difficult over the last 20 years is to try and relate data from the Texas Parks and Wildlife monitoring program to fresh water inflow.

And it's kind of a good example of when all you have is a hammer, everything looks like a nail. When the State first had to start thinking about devising methodologies to define fresh water inflow needs for estuaries, what data set existed? Well, Parks and Wildlife had this monitoring data set. Again, it was designed to build fishing regulations across the entire state, not to look at salinity gradients within specific estuaries.

So the way they sample is they essentially do random sampling within bays, and they do it statewide. The problem, of course, is I've talked about how important the salinity gradient is along the length of the estuary, so they didn't have that kind of data.

So what happens is every time someone tried to do a statistical relationship between anything Parks and Wildlife had in their data set and salinity or inflow, it would always be very weak or wouldn't work very well.

Well, what we realized was, we weren't using all the information. Because in fact they collect a lot of other data. They collect, for example, dissolved oxygen, as well as the salinity of the temperature, other physical things, the depth of the sample.

And we were also able to add some other factors, distance to the river, distance from a pass. And we discovered a new, well, it was new to ecology, statistical technique that was able -- that enabled us to take this complex multigraded data set and try and understand what were the important factors driving the distribution of these animals, both in space and time.

And this is actually an outgrowth of a much larger project we have to try and identify species that would be inflow indicators across the entire country actually. And so we decided to do an analysis on the fish in Nueces Bay to see if

there were any fish there who are dependent on salinity gradients.

And one of the species we looked at were blue crab. And the results were pretty stunning, in a lot of ways, because for the very first time -- I feel for the first time, we had a strong statistic -- using the same data set most people hadn't been very successful at using, we had, we had a very strong, we were able to look at the exact contribution of all the different factors that could affect abundance and distribution, and then we combined, and from that statistical output, we put the data in maps, so that we could understand the distribution as it related to the whole bay, in other words, distribution as it might be related to salinity gradients within the bay.

And one of the amazing things that came out of it, to me, was, for example, that blue crabs, for example, had a preferred salinity range exactly like all the scientific literature tells us, 5 to 20 parts per thousand or so, but also now we had ways to model potential changes.

So what we could do is we could do essentially a calculation now and ask, well, what if the salinity had been 5 parts per thousand higher or 10 parts per thousand higher, or what if it had been a little bit less?

And what we discovered is if you would reduce the salinity in Nueces Bay, it would increase the probability of finding crabs. And if you increase the salinity, it reduced the

probability of finding crabs in the bay.

Q. Now --

THE COURT: You spoke earlier that the ideal sweet spot was 5 to 25. Is it 5 to 20?

THE WITNESS: I would say the ideal sweet spot is really 10 to 20. Imagine a bell-shaped curve. The biggest part of the sweet spot would be 10 to 20. The entire length of the curve would be literally 0 to about 25.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. So if you were below 25, you would be okay?

A. Yes. Those are good conditions.

Q. And now the data that you used for the boosted tree regression in Nueces Bay, was that the data that was the commercial catch data, or was it from the middle of the bay, or was it from the edge of the bay?

A. The data set we used was from the Parks and Wildlife bag seines. So that's fishery independent. And all the bag seines are collected on the margins of the bay.

Q. So it was essentially a test specifically to the edge of the bay?

A. Yes.

Q. And where would you --

THE COURT: Did you call this the boosted tree regression?

THE WITNESS: It's called boosted regression tree. That's the name of the statistical --

THE COURT: Boosted regression tree.

MR. BLACKBURN: Sorry, I got it juxtaposed there.

THE COURT: Well, I didn't have it at all.

MR. BLACKBURN: Well, I should have it, but --

BY MR. BLACKBURN:

Q. Now, would it be surprising that there wouldn't be a lot of crabs in the middle of the bay if they hang out on the edge?

A. That would not be surprising, no.

Q. So, but a lot of the data that has been used historically to evaluate crab availability or to try to link salinities and crabs has been from data collected in the middle -- I mean from crab data collected in the middle of the bay. Is that right?

A. That's correct, from trawls.

Q. And that's what you were talking about trying to get the right information and the right hammer and nail combination.

A. Yes.

Q. So after you ran that boosted regression tree analysis in the Nueces Bay, did you have occasion to run that analysis for San Antonio Bay?

A. Yes.

Q. Now, could I have Exhibit 246, please. And these are somewhat small, but I think you know, Dr. Montagna, which ones are which, but --

A. Yes.
Q. You know, I think we can probably zero in on, at least on the six boxes. Now, looking at those, can you -- I mean, is this the result of your analysis of, boosted regression tree analysis for San Antonio Bay?
A. Yes. What this represents is all the variables that were used in the analysis. And the far left is temperature -- oops, I got this backwards -- temperature, year, dissolved oxygen, salinity, month, and depth.
Q. Okay.
A. And what we look at here is we try and look at -- basically this defines the probability of finding something over the values. So, for example, for temperature, you don't find crabs when it's below 10 degrees. Most of the crabs are found in the temperature range of 10 to 25 degrees. That would be centigrade.
Salinity, for example, the highest probability of finding crabs --
THE COURT: Okay. You know, this is, the words are blurred. Salinity is in the far right upper?
THE WITNESS: Yes.
THE COURT: Is that right?
MR. BLACKBURN: We're going to zoom in.
THE COURT: It's too blurry.
MR. BLACKBURN: We're going to zoom in on salinity.

You want to zoom in on temperature? That would be the first one on the left. There you go.

THE WITNESS: Uh-huh.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. We have temperature and year.

A. Yeah. So you know, basically the reason why there's a sweet spot for temperature is because, you know, crab abundance peaks in the spring. So naturally you don't find it in the dead of winter, you don't find as many in the height of summer, when we're getting these high temperatures.

This chart, notice there's essentially a steady decline over time. That is something we've seen in that other exhibit you put up. So it's just reiterating, yep, there's been a decline over time. And so year-to-year variability is important.

Q. Okay. The next two, if you can.

A. And this one shows the relationship of dissolved oxygen. Here's an interesting number, 5 milligrams per liter is the water quality standard that TCEQ uses to define exceptional quality of life, meaning that if it's over 5, it's really good. Below 5, it's bad. And so you can see that one, dissolved oxygen is really high. That's better for organisms.

And then the salinity one, I think you said we had a --

Q. Well, we'll look at a much more blown up detail --

A. Let's look at the blown up one later.

MR. BLACKBURN: Okay. Go to the two at the bottom, please, Patrick.

THE WITNESS: So it's important here, too, now this is month, and again it shows that you're more likely to find crabs in April, May, than you would in October through December. That's what that's telling you.

And finally, this last one, see, finally we're -- but also, this is not too important, because everything bounces around zero. And this is not very -- and this is depth. So the depth at which the sample was taken doesn't appear to be very important either.

BY MR. BLACKBURN:

Q. So there's been a lot of talk in this case about the role of water movement and water levels in terms of crab availabilities and things like that. And at least along the bay edge, does water depth make a lot of difference?

A. No, I don't believe so. Again, most of the crab are living at the margins of the marshes. And like many of the organisms that inhabit the marshes, when the tides rise and fall, they simply shift their distribution with the water level.

Q. And with regard to the crabs and water level, I mean, do northers routinely come through the Texas Coast?

A. Oh, yes. I think we get 23 to 26 per year.

Q. Does the water blow out of the marshes when they come through if they're on the north side, and blow across to the south side? Or out the passes?

A. Yes. This is a very well-known phenomenon to all fishermen. We call it set up and set down, in fact. And it's well-known that when there's a lot of water moving around because of a norther, it's especially, if you can brave the weather, it's an especially good day to go fishing, for example, particularly where it's piling up, the side where it's piling up.

Q. But it's a well-known phenomena that comes and goes every year?

A. Well, as I said, more than 20 times a year.

Q. And so would it surprise you that on occasions that the marsh ponds in the Aransas, Black Jack Peninsula might be dewatered?

A. No, absolutely not. In fact, it's very predictable.

The other thing that's interesting about tides along the Texas Coast is that the seasonal elevation is actually twice as large as our daily change. So in the coast adjacent to the Atlantic and Pacific, where you've got the whole ocean, you might have, the rise and fall of the tide might be five feet a day, from low high -- low tide to high tide. And it occurs twice a day.

The Gulf of Mexico is microtidal. Typically, our tidal

range is one foot or so a day. And some days, we don't get a tide. If the wind's blowing, for example, it's not uncommon for -- in fact, I've seen conditions where the tide's supposed to be going out, and it is actually coming in because of a norther approaching.

And so the other part of the tidal signal, so the daily thing is literally, you know, the earth's rotation with the moon, but because of the earth's rotation around the sun, there's also a seasonal component to tide.

On the east and west coast, that's hardly noticeable. But still we use the term spring tide and neap tied; spring for when tides are a little bit higher than normal, neap for when tides are a little bit lower than normal.

In the Texas Coast, it's really all about the spring and the neap tides. So we essentially have low tide throughout most of July and low tide throughout most of February. And then we have high tide unfortunately in October, when we typically have storms as well, which is one reason why hurricanes are so damaging. We actually get hurricanes during our high, the water's already high naturally anyway. And then of course in April --

THE COURT: High tide is October, did you say?

THE WITNESS: Yeah, October, and then six months later would be April. It's -- I always get a kick out of, you know, living in Port Aransas. Seems like we always get a real

strong tide when spring breakers are trying to camp on the beach, they get flooded. That's why, it's our spring tide season.

THE COURT: Oh, you love it.

THE WITNESS: Yes.

MR. BLACKBURN: You're also learning a bit about his sense of humor, Judge.

BY MR. BLACKBURN:

Q. Now, so to the extent that someone is putting forward information in this trial that there's some incredible negative force working in terms of the way that the water moves in and out relative to crabs, you know, the water moving in and out of the marsh with, you know, being blown out, is that part of the normal life cycle of crabs on the Texas Coast?

A. Yes, of course. You know, as I've said, we're going to get about 20 northers a year. And so the, you know, the crabs are well adapted to constantly moving, you know, up and down with the tidal levels. Again, there are these seasonal cycles.

Now, there's something else really interesting about those seasonal cycles. You notice I said we get high tides, for example, in October. Well, guess when most of the shrimp are recruited in the bays? October.

And as I said earlier, the estuarine -- many of the species are actually adapted to take advantage of those levels. You know, this is one reason why they're spawning at that time

of the year, because, you know, the organism has adapted so that the larvae have a force that pushes them back into the bay with those spring tides.

So the whole elevation thing is, it's just a natural part of the way the system functions. It's literally part of the ecosystem functioning.

THE COURT: So was there anything weird about the tide in '08 or '09, that winter, that was different than any other year?

THE WITNESS: Not that I'm aware of.

THE COURT: Okay. Would you have been aware of it?

THE WITNESS: Yeah, partly because I live right on the bay myself. I usually notice real high water, and I notice real low water, because it affects my property.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And now I'd like you to look at Exhibit 246, please.

MR. WAITES: 248?

MR. BLACKBURN: I've got 248 as well. I'm sorry, wait. No, let's go --

BY MR. BLACKBURN:

Q. I'm sorry, we haven't hit the strong salinity one. That's the one I -- this is Exhibit 248. Now, we said we were going to come to salinity and the blue crab. This is the boosted regression analysis that was done. Would you describe the

result of this?

A. Yes. This is actually the same exact data that was in the earlier slide. The difference here is that we've, obviously we've blown it up. And the other thing is, you'll notice that it's kind of more of a square confirmation, so the shape might appear to be a little different.

But what it depicts is, on the left axis, that's the probability of finding a crab.

THE COURT: The what? Probability of --

THE WITNESS: The probability of finding a crab. We should have labeled that. And on the X axis, that's salinity. So this tells you how likely you are to find a salinity, to find a crab at various salinities. And you'll notice literally, there's a nice bell-shaped relationship -- well, first of all you'll notice that essentially they're distributed between zero parts per thousand and, you know, all the way up to fully marine. But they're not very common here.

And you'll notice that there's a nice little bell-shaped curve in this part of it, and that's what I would call the sweet spot, where this is about 18 or so. It starts to drop off precipitously around 22. And when it hits about 25, there's another sharp drop. And so this is, this actually confirms, this is actually confirmatory.

Parks and Wildlife did a study that is often -- where Warren Pulich was the chief author, and he said something like

crabs are more likely to be found in trawls, for example, in about 15 to 25 --

THE COURT: In what?

THE WITNESS: In trawl samples.

THE COURT: Okay.

THE WITNESS: In other words, runs in the middle of the bay, at about 15 to 20. Lynn Hamlin did a master's thesis where she came to the conclusion that crabs are more likely to be found at salinities less than 20 parts per thousand. So it's not surprising that along the marsh edge, we also find the same result, which is that crabs are more likely to be found when salinities are between about 15 and 25 parts per thousand.

BY MR. BLACKBURN:

Q. And that's what this shows?

A. That's exactly what this shows.

Q. And this is an analysis specific for the San Antonio Bay sort of Aransas Refuge area?

A. Yes. It's in the entire San Antonio Bay coastline, which would include the shorelines along Matagorda Island and the shoreline along the Aransas Wildlife Refuge. And again, these are from the bag seines. So if you think about it, this is exactly the probability of a whooping crane finding a crab, because we're sampling in the same exact locations.

Q. So basically, as the salinity gets above 25 parts per thousand, the chance of a whooping crane finding a crab will be

diminished. Is that fair?
A. Yes.
MR. BLACKBURN: Now, Exhibit 249, please.
BY MR. BLACKBURN:
Q. So are these the, kind of sort of the graphic results of the analysis that was completed?
A. Yes. And so what we're able to do is basically take the model output and link it back up to a spatial analysis where we can, and then we put it into, it's called GIS, a Graphic Information System. So basically now we're taking our statistics and we're moving the output into a mapping technology, to enable us to visualize distributions as it relates to the shoreline. And hopefully you can recognize the key features of the outline here, Heinz Bay. This is where the Guadalupe River would actually be coming in, Black Jack Peninsula, the Matagorda Island shoreline.
And what the color represents is, cold means not a lot of crabs. Warmer means more crabs. And this would be the overall average probability of occurrence under average salinity conditions. And -- well, that's what this is representing.
Q. Okay. And then if you could show --
MR. BLACKBURN: Exhibit 250, please. And blow that up, please. And -- oh, we went, I think we cut off his legend.
BY MR. BLACKBURN:
Q. So what does this graphic show us?

A. So because this statistical technique is regression, we can predict what the result would be under different conditions of X. It's exactly like linear regression. You have Y equals X. Y is the probability of finding a blue crab. X is the condition that we're predicting it at.

So this would predict the occurrence of blue crabs if the mean salinity was reduced by 5 PSU. And you can --

Q. That -- I'm sorry.

A. And basically, what you can see is that the colors are warming up.

Q. And next slide.

A. Particularly in this area and this area.

Q. Okay. Next slide.

MR. BLACKBURN: And tighten in on that a little bit. A little too far. There we go.

BY MR. BLACKBURN:

Q. And here we're talking about reducing salinity by ten units?

A. By ten units. And you'll notice that particularly along this shoreline that the area of that habitat is increased in size.

Q. So this is what you're talking about as the salinity gradient changes, the, in this case, crab utilization or the chance of finding crabs increases.

A. Yes.

Q. Okay. And then the next exhibit, which is 251, I believe, or 252?

MR. WAITES: 252.

BY MR. BLACKBURN:

Q. Okay. And this is with an increase of five over average?

A. Yes.

Q. And then --

A. In this case, you can see that actually we're getting bluer, meaning we find less crabs here. But it's quite warmer in this part of the area.

Q. So off of average, it's moving, you know, moving it up for a bit?

A. Yes.

Q. And then next slide, and then this would be with an increase in 10 PSU. Right?

A. Yeah, this one's particularly interesting. Because what it's showing now is that essentially we're eliminating blue crabs from the back of Matagorda Island, if salinities were to increase by 10 parts per thousand.

Q. And so, and that's off of an average salinity?

A. Right. This is a change relative to the overall average.

Q. So --

MR. BLACKBURN: And you can take that down, please.

BY MR. BLACKBURN:

Q. And so with regard to the work that you've done in your

analysis of San Antonio Bay, do you have an opinion that you hold with a reasonable degree of scientific certainty as to whether or not increasing the salinity in the bay margins adjacent to whooping crane habitat by 5 PSU or 10 PSU would make a significant difference in the likelihood of blue crab capture by whooping cranes?

A. Yes. I believe that as the salinity increased, it would reduce the likelihood of whooping cranes being able to find blue crab.

Q. And with regard to the long-term trends with regard to blue crab populations, given that long-term trend, do you have an opinion that you hold with a reasonable degree of scientific certainty as to whether or not the impacts of salinity increases are important to blue crab abundance in the San Antonio Bay system?

A. Yes. I believe that for the blue crab to rebound, we've got to maintain the habitat conditions in which we know they would thrive. We, from a variety of studies plus my own analyses, we know they prefer salinities in that 10 to 20 part per thousand range, or maybe it's 15 to 25. And if salinities got higher than that, then there would be no habitat for them to come back into.

THE COURT: Higher than what?

THE WITNESS: Well, for the population to rebound, there has to be a place for them to live.

THE COURT: Okay.

THE WITNESS: And if it's not there, it's not there.

BY MR. BLACKBURN:

Q. And so if conditions were maintained throughout the system as best as could be below 25 parts per thousand, like 25 parts per thousand down to zero, would that be conducive to blue crab development?

A. Yes.

Q. Now, assume with me that blue crabs are an essential protein source for whooping cranes. Given that assumption, would you please explain your opinion as to whether or not it's reasonable to conclude that a cause and effect relationship would exist between low inflow into San Antonio Bay and whooping crane mortality?

A. Well, as the analysis, the boosted regression tree especially analysis, spatial analysis showed, if blue crab -- if the probability of a blue crab, finding a blue crab decreased, then the birds are going to have to work a little harder to find a source of protein, a source of nitrogen. And at some point, it's going to reach this energetic balance, where it has to expend more energy to find the food source than it gets out of receiving the food source. So I can see how shifting the population distribution of a blue crab could have an effect on the whooping crane.

Q. And by the way, you used the term "energetics." Are you

an energetics expert?
A. Yes, I am.
Q. Now, in closing, I want to return your attention to Senate Bill 3. You are a participant from the scientific side of Senate Bill 3. You have participated in the Science Advisory Committee. You have, I think, interacted with some of the, what's called B-B-E-S-T, BBEST groups. Are you familiar with that process?
A. Yes.
Q. Are the scientists essentially working in a process where politics is dominant?
A. The scientists know -- in fact, the statute specifically requires that the inflow recommendation made by the science team not be influenced by human needs. And my assumption is that that's where politics would play a role into it.
Q. But now as the Senate Bill 3 process works, the scientist BBEST group is then followed by something called BBASC. Is that right?
A. Yes, the stakeholder group in general.
Q. And what is the stakeholder group?
A. Well, the stakeholder group has a completely different charge. The stakeholder group also comes up with a recommended inflow regime, and they can consider the BBEST result, but they could also provide a completely different answer if they prefer.

So the whole concept is that the human need and human uses would be injected into the planning process by stakeholder groups.

Q. And then does the BBASC recommendation then go to the Texas Commission on Environmental Quality?

A. Yes.

Q. And is there yet again another level of political review?

A. Yes. The TCEQ then takes -- now, they wind up with two recommendations.

Q. The BBEST recommendation and --

A. Yes, the science team --

Q. And the BB --

A. -- and the stakeholder recommendations independently, and they also solicit public input. And then they come up with a draft rule. And using a combination of now these three inputs, public input, the science input, the stakeholder input, they then publish a rule.

Q. And --

MR. BLACKBURN: Yes, Your Honor?

THE COURT: Speaking of politics, this shouldn't be in the Court, but don't we have a Chief Executive of the State that doesn't believe in climate change?

THE WITNESS: I think I've heard the Governor express such things, yes.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. So science, let me just ask you right now, is science fairing well in the State of Texas in the political process, in your opinion?

A. Heck, I don't think science fairs well in any of our decision-making processes. One of the things I've spent a lot of my career on is working at this interface of science-based decision making. And one of the interesting things about science-based decision making in general is that science usually plays a very small role. If, if at all, it might get the first word, but it certainly never gets the last word. And if you think about it, all decisions kind of rest on a four-legged stool. Science is just one of the legs. Another leg is going to be socioeconomic issues. Another leg is going to be, frankly, politics. And finally, the other leg is going to be public perceptions, which perhaps is also politics.

So what happens is, and it doesn't really matter what the issue is, this is true for everything we do, you know, we try and use -- you know, science gets used as -- it's just one of the things that goes into the process.

Q. But in terms of San Antonio Bay, from a science perspective, if you were attempting to maintain San Antonio Bay as an estuary, what would you do?

A. What would I do?

Q. What would you do?

A. Well, for example, right now the BBEST report for San Antonio Bay recommends a little bit more than a million acre feet per year distributed over -- of fresh water inflow, distributed over a certain amount of months. And they came to the conclusion that that would sustain the ecological soundness of the bay. And that's probably a pretty good number. Whether that number is the one that gets utilized or not, I have no way of knowing.

The only thing that I'll have to admit has been a little disconcerting is what I've seen happen in the first two systems that have completed the process.

Q. Okay. Let's take those one at a time. What was the first system that completed the process in Texas?

A. Well, the Sabine-Neches Rivers, which drain in the San Antonio Bay and the --

Q. You mean the Sabine-Neches systems that drain into --

A. Sabine-Neches system.

Q. That drain into what?

A. Into, excuse me --

Q. Sabine Lake?

A. Sabine Lake.

Q. You said, "San Antonio Bay."

A. I said, "San Antonio Bay." That's completely incorrect. And then the second group that has completed the process is the Trinity and San Jacinto Rivers, which drain -- basins, which

drain into Galveston Bay.

Q. So what happened in those processes?

A. Well, what happened was is the science teams came up with one number. The stakeholder teams came up with a lower number. And TCEQ recommended a number even lower than that.

Q. So the science number got reduced by the stakeholder group, and the stakeholder group's number even got reduced further by the TCEQ.

A. Yes.

Q. Did the Science Advisory Committee say anything about this?

A. Well, that's not our role. We actually did receive briefings on the rule when it was both in draft form and in final form. The only -- it's interesting, the Science Advisory Committee's only role is to provide a consistent set of guidance on how to go about performing an inflow or an instream environmental flow study. And so our main job has been to create a series of, we call them guidance documents.

Now, we also have a role to advise the environmental flow advisory group, which is composed of three senators, three house members, and the heads of the three big agencies, TCEQ, Parks and Wildlife and the Water Board. And so the way we advise them is we provide a review of the science team's report, but we don't -- I'm not sure we've ever seen the stakeholders' report. I personally have never looked at one.

So that doesn't come to us. That goes directly to TCEQ.

And so there's really no -- and even the review that the Science Advisory Committee provides, it's not a review in the context of we didn't like this, we didn't like that, go fix it. The science team report arrives whole. It doesn't get changed or edited at all.

And in fact, we've taken a strict interpretation of statute in terms of what the SAC role is. And the only thing we try -- we only ask ourselves two questions essentially. One is, did they use all the best information available. Did they make a reasonable attempt to discover the best scientific information available, and did they use the best information available? And you know, and in fact, that's a pretty low bar. So no one's had any trouble passing that bar.

And then the second question we have to answer is did they use a scientific technical process that was without influence, without outside influence. Did they base their decision, their recommendation, rather, solely on the science that's available to them at that time.

So that's really the limit at which the SAC review of the science team report is held.

MR. BLACKBURN: Okay. Thank you, Mr., Dr. Montagna. No further questions, Your Honor. Pass the witness.

THE COURT: Thank you.

MR. TAYLOR: Your Honor, before I begin, I've got

three new Defendant's exhibits I'd like to offer, and they're not objected to. And I understand they actually correlate with some of the Plaintiff's exhibits, and I'll point that out during my examination.

But at this time Defendants would like to offer Defendant's Exhibits 391, 392 --

THE COURT: Wait a minute. Sorry.

MR. TAYLOR: I'm sorry.

THE COURT: I put down 300 and 91. 391.

MR. TAYLOR: 391, 392 and 393.

THE COURT: Any objection?

MR. BLACKBURN: No, no objection. Aren't these the same ones I was showing?

MR. TAYLOR: Most of them correlate, and I'll explain the corresponding number when I go through it.

MR. BLACKBURN: Okay.

THE COURT: Admitted.

CROSS-EXAMINATION

BY MR. TAYLOR:

Q. Good afternoon, Dr. Montagna. Before I talk to you about your opinions relating to salinity's effect on blue crab, I want to take a step back in the chain of causation and talk first about your opinions and what you believe impacts salinity. Okay?

Isn't it your opinion that climate is one of the most

important factors affecting salinity in the Guadalupe Estuary?
A. Yes, through the rainfall.
THE COURT: Through the drought?
THE WITNESS: Yes.
THE COURT: Okay.
BY MR. TAYLOR:
Q. For example, drought has a significant impact on salinity levels. Correct?
A. Correct.
Q. And don't you believe that tides are also an important factor affecting salinity in the Guadalupe Estuary?
A. Yes.
Q. Don't you agree that evaporation affects salinity levels?
A. Yes.
Q. Do you also agree that temperatures affect salinity?
A. Indirectly.
Q. Indirectly? Okay. Are there other climate, climatic or climatological conditions that you believe affect salinity?
A. Well again, indirectly, humidity.
Q. Okay. Anything else?
A. No.
Q. Okay. All right. Now I'd like to talk and focus on your opinions about the impact of salinity on blue crabs. Okay? You talked in your direct examination about the boosted regression tree that serves as part of the basis for some of

your opinions in this case. You remember that testimony?
A. Yes.
Q. And if we can put up on the screen Defendant's Exhibit 391, and if we can blow that up to make it a little bigger.
THE COURT: Looks like a rabbit, doesn't it?
BY MR. TAYLOR:
Q. This is one of the figures that you were shown in your examination. And as I understand it, this is the boosted regression tree's prediction of blue crab capture based on an increase of 10 parts per thousand, or 10 PSU. Is that correct?
A. Yes.
Q. And if I understood your report correctly, your opinion is that if salinity increases 10 PSU or 10 parts per thousand over the mean salinity in the bay, blue crab abundance will decrease up to 5 percent. Is that right?
A. Yes.
Q. So if you have an increase of 10 parts per thousand or 10 PSU in salinity, the impact on blue crab capture rates would be between 0 and 5 percent. Isn't that right?
A. Ask that one more time.
Q. Sure. If you had an increase, as we see in this Defendant's Exhibit 391, of 10 parts per thousand, or 10 PSU in salinity, then that would decrease, in your opinion, blue crab capture rates by up to 5 percent.
A. Yes.

THE COURT: Say that again. I didn't understand it.
MR. TAYLOR: Okay.
THE COURT: Can he, you want to explain it to me? Either one is fine.
MR. TAYLOR: Yes. Well, the point I'm trying to make is that if salinity is increased by 10 parts per thousand, then --
THE COURT: From what to what? I mean, starting where?
MR. TAYLOR: Over the mean, over the average.
THE WITNESS: Over the mean.
THE COURT: Over 20.
MR. TAYLOR: Over the mean, over the average.
BY MR. TAYLOR:
Q. We've got the mean. It increases 10 parts per thousand over that. Then the corresponding decrease in blue crab is from 0 to 5 percent, right, up to 5 percent?
A. Yes, I believe -- I think that's the number I recall we calculated.
Q. Okay, thank you.
THE COURT: Over what period of time? 5 percent a year or 5 percent a month or --
THE WITNESS: That would be over the, over the entire data set. So over like long-term average.
And that would be the other thing I would point out

about figures like this, is that you'll notice that there's also kind of a shift in space. So if the -- for example, I think I recall the long-term in salinity here is around 18. So when we say increased by 10 PSU, we mean that the overall average salinity is probably around, let's say 28, if it started at 18.

But again, what happens is that there's a gradient, and so in fact you get different distributions because the optimal salinity zones are in different parts of the bay at different times.

BY MR. TAYLOR:

Q. Okay. And turning back to Defendant's Exhibit 391 -- and I apologize, I said I was going to give you the corresponding Plaintiff's Exhibit, this is Plaintiff's Exhibit 253 -- but here in Defendant's Exhibit 391, the shape that we see here that Judge Jack called a rabbit, that's in essence the outline of the San Antonio Bay. Correct?

A. Yes.

Q. And so your BRT model or the boosted regression tree model was attempting to predict the impact on the probability of blue crab capture around the edges of the margin of the bay. Right?

A. Well, specifically wherever Parks and Wildlife would set a seine.

Q. Great.

A. And that's where they set it. They set it usually from

the shoreline, perpendicular to the shoreline out.
Q. Got it. And so in this case, it's the outline of the bay. Correct?
A. Yes.
Q. Okay. So let me, let's do a little side by side so we can sort of get the context of what this is. So let's look at a side by side of Defendant's Exhibit 391 with Plaintiff's Exhibit 10, which is a map of the whooping crane territory. Are you with me?
A. Sure.
Q. So --
MR. TAYLOR: Could we make that a little bit bigger? The two of them go up just a little bit? Okay. It is a little bit bigger.
BY MR. TAYLOR:
Q. Okay. And so you could sort of see roughly that Defendant's Exhibit 391 is the outline of the shape that we see of the San Antonio Bay in Plaintiff's Exhibit 10. Do you see that?
A. Yes.
Q. And so for comparison purposes, I'd like to just transpose or put Defendant's Exhibit 391 on top of Plaintiff's Exhibit 10 and see what that looks like.
So what your, the BRT model, your opinions are based on was intended to predict blue crab capture, where we see the

insert of the BRT output graph over the bay, correct, like we see up on top of the screen?

A. Yes.

Q. Okay. And so the model does not predict, attempt to predict blue crab, blue crab capture over the other parts of the whooping crane territory that we see here. Correct?

A. Yes.

Q. Okay. All right. Now I want to talk to you about in the BRT model that was run some of the other factors that were found to affect blue crab abundance, other than salinity. Okay? Let's look at Defendant's Exhibit 392, which is also Plaintiff's Exhibit 247. And this is actually a combined, this is a copy of a page from your report, or your addendum to your report. But I want to talk about the bar chart on the bottom.

In this bar chart on the bottom of Defendant's Exhibit 392, don't we see the relative values, the relative impact of the six factors that were tested on blue crab abundance?

A. Yes.

Q. So these were the six factors that were tested in that BRT model. Correct?

A. Yes.

Q. And up at the top, we've got the temperature with the long blue line, and down at the bottom, we see depth with the short blue line. These are in descending order, where the factor that had the greatest impact is on top. Correct?

A. Yes.
Q. Okay. So up at the top, the BRT model found that temperature had the greatest impact or effect on blue crab abundance. Correct?
A. Yes.
Q. All right.
MR. TAYLOR: And why don't we show the top of Defendant's Exhibit 392, the little temperature graph that, at the top left -- right there, yes.
BY MR. TAYLOR:
Q. And so this is the temperature graph that shows the impact of temperature on blue crab abundance. Correct?
A. Yes.
Q. And as I understand it, someone smarter than me told me that 10 degrees Celsius or centigrade was roughly 50 degrees Fahrenheit. Does that sound about right?
A. Yes.
Q. Okay. So when temperatures increase above 10 degrees, or below 10 degrees centigrade, then the blue crab abundance decreases. Right?
A. Yes.
Q. Okay. Let's go back to the bottom of Defendant's Exhibit 392. And now of the six factors that were tested, the second factor, the factor that had the second most impact on blue crab abundance was year. Right?

A. Yes.
Q. And that's consistent with your testimony that we saw of a downward regression line, that there's a long-term 30-year downward trend in blue crab abundance. Right?
A. Yes.
Q. Let's go back to the top of Defendant's Exhibit 391. And this is the graph that shows the impact of year on blue crab abundance. Right?
A. Yes.
Q. And I notice that it appears that there was an increase in blue crab abundance, and this is specific to the Guadalupe Estuary. Right?
A. Yes.
Q. And there was an increase in blue crab abundance in, looks like 2008-2009. Do you agree with that? Do you see down at the bottom we've got the years, 2005, and then I'm assuming that 2010 is maybe the next line. But doesn't it appear that there's an increase around 2008 and 2009 in blue crab abundance in the Guadalupe Estuary?
A. Yes, it looks like each unit on the bottom is a five year, so that would be maybe more 2009 to 2010.
Q. Okay. Let's go back to the bar chart on the bottom. So of the six factors that were tested in your BRT model, the factor that had the, or the variable that had the third most, was shown to have the third greatest impact on blue crab

abundance was DO, which is dissolved oxygen. Right?
A. Yes.
Q. Is that essentially the oxygen that's dissolved in the water that helps the crabs breathe?
A. Yes.
Q. Okay. Now, I notice that the next two are basically neck and neck. So wouldn't you agree that the results of the BRT model found that salinity was only slightly, only had only a slightly greater impact on blue crab abundance than month?
A. Yes.
Q. For example, I think the numbers were 14.4 percent to 14.3 percent. Right?
A. Yes.
Q. So of the six factors that the BRT model tested, salinity came in fourth place by .1 percent. Right?
A. Yes.
Q. And the BRT model also found that depth had an impact on blue crab abundance. Correct?
A. We had to find something, because it was included on the model.
Q. Got it. Thank you.
THE COURT: Which of the only one of those do we have any control over?
THE WITNESS: The only one we have control over is probably salinity, in the context of water diversion. But also

we have some control over dissolved oxygen, in the context of nutrient loading to estuaries, which --

THE COURT: Which has to do with fresh water intake as well.

THE WITNESS: Yes.

THE COURT: So both salinity and dissolved oxygen relate to fresh water inflows?

THE WITNESS: Yes. Well, believe it or not --

THE COURT: So together, they're what?

THE WITNESS: Temperature does as well.

THE COURT: Okay.

THE WITNESS: Well, the temperature in this context is probably driven primarily by the seasonal.

THE COURT: Okay.

THE WITNESS: But, of course, when the water is flowing, water coming from a river typically is cooler than water coming -- than the bay water.

THE COURT: Okay.

THE WITNESS: At least in the summer.

MR. TAYLOR: I'll pass the witness, Your Honor.

THE COURT: Thank you, sir.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Now, just to be clear, if you were managing the shoreline of Aransas National Wildlife Refuge, reasonable goal 25 parts

per thousand salinity? Or below?
A. That would be the upper end.
Q. So --
A. In fact, if you don't have times when it gets down into the low teens, 10 to 15, you really can't, the crabs can't rid themselves of parasites.
THE COURT: Pardon? Say that again.
THE WITNESS: The crabs will not be able to rid themselves of parasites unless there's at least some time or some space they can go to where it's a lot lower than that.
BY MR. BLACKBURN:
Q. And you made two --
THE COURT: Unless, unless it's under 25?
THE WITNESS: Yeah. I'm saying 25 would be upper bounds. I would like to see a lot of area, or at least times when the salinity is, you know, around 10-ish, 10 to 15.
BY MR. BLACKBURN:
Q. Now, during drought conditions, things are going to be tough throughout a bay system.
A. Yes.
Q. Would you agree with that?
A. Yes.
Q. I mean, that's just sort of part of the, kind of the ecological process. Is that when it's most important to try to maintain some semblance of proximity or closeness to 25 parts

per thousand or lower?
A. Yes.
Q. And you mentioned two things, and I just want to go back over it, because you know, there were percentages -- and I don't know if you misstated or not, but you said -- is it 5 parts per thousand adds 5 percent, and 10 parts per thousand increases 10 percent? Or was it -- do you remember?
A. No, I don't remember.
Q. But the important point that I wanted to ask you about was geography, and if what the BRT shows was the movement of crabs within the bay, based on where those salinity gradients moved.
A. Yeah. In fact, when I saw the picture where he overlaid the boosted regression tree distribution of the crane, what I noticed was that the area along Matagorda Island became very devoid of crabs. And the crab distribution moved way upstream, which would mean the cranes would have to work a little harder to go get them, have to go larger distances. They wouldn't be able to forage in their territorial areas. They would have to move.
Q. And if they didn't move, it would mean that the crabs were moving out of their areas.
A. That's exactly what I'm trying to say. Crabs are moving -- they would be more likely to find crabs up in the upper parts of the estuary --
Q. And if they --

A. -- or bay.
Q. And if they basically stick to the areas that they have as territories, fewer crabs?
A. Yes.
MR. BLACKBURN: Thank you, Your Honor.
THE COURT: Thank you.
MR. TAYLOR: Nothing on recross. Thanks.
THE COURT: Thank you, sir.
THE WITNESS: Thank you.
MR. BLACKBURN: May Dr. Montagna be excused?
THE COURT: Yes. Thank you.
MR. BLACKBURN: I'd like to call --
THE COURT: I enjoyed --
MR. BLACKBURN: I'm sorry?
THE COURT: -- both, all of your witnesses today, and the cross-examination. It was really interesting. You're not finished, but I'm just saying that.
MR. BLACKBURN: I'd like to call Joe Trungale to the stand, please.
THE COURT: Would you administer the oath. Sorry, that's for disability access, and it causes more injuries.
(Witness sworn.)

JOE TRUNGALE, PLAINTIFF'S WITNESS NO. 8, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Good afternoon, Mr. Trungale.
A. Good afternoon.
THE COURT: Could you spell your name for me, please, sir?
THE WITNESS: T-R-U-N-G-A-L-E.
THE COURT: Thank you, sir.
BY MR. BLACKBURN:
Q. And I don't know if you're one of the witnesses who may need to put their elbow -- now, don't touch it, but --
THE COURT: Meaning the microphone.
BY MR. BLACKBURN:
Q. Don't move it, for sure, but be near to it and speak into it.
Where do you live, Mr. Trungale?
A. Austin, Texas.
Q. And how are you currently employed?
A. I'm a water resource engineer. I'm a private consultant.
MR. BLACKBURN: And excuse me. The resumé, what's the exhibit number?
MR. WAITES: 262. Plaintiff's 262.
MR. BLACKBURN: 262?
BY MR. BLACKBURN:
Q. Did you provide us with a copy of the resumé that is Exhibit 262? And I think --
A. Yes, I did.

Q. And could you just offer a brief summary of what the Judge can find in Exhibit 262 if she were to look at a later time? Quickly, what is your educational background?

A. I have a bachelor's degree from Georgetown University in English literature, master's from University of Washington in civil engineering, and for the last five or six years, I've been pursuing a Ph.D. candidacy in aquatic biology at Texas State University.

Q. And do you have any professional registrations in the State of Texas?

A. I'm a licensed Professional Engineer.

Q. So you're a registered Professional Engineer in the state?

A. Yes, sir.

Q. Could you provide a brief summary of your employment history?

A. When I completed my master's degree in civil engineering, I worked for a short time for the Potomac River Basin Commission in Washington, DC, managing raw water supply for Washington, DC. Then I worked as a consultant with HDR Engineering here in Austin, or in Austin, where I worked on regional planning and development of water availability models.

For about five years I was with the Texas Parks and Wildlife Department as the river studies hydrologist. And then for about the last seven years, I've had my own consulting firm.

Q. And would you describe the type of work that you primarily do? We're going to be getting into some areas that, you know, a lot of folks may not be familiar with, so --

A. I work primarily on water resource issues related to planning and permitting, related to water rights. But my real area of technical expertise has to do with the development and application of models to evaluate how habitats change with different water management scenarios. And I work both in the riverine system as well as estuarine systems.

Q. So when you talk about how habitats change, would that be, among other things, the estuaries that was just described by Dr. Montagna?

A. Yes.

Q. Now, do you undertake what is known as simulation modeling?

A. Yes, I do.

Q. What does that mean?

A. Simulation modeling is the use of a model to predict the response of the system to changes in inputs. The inputs primarily being the flows, the outputs or the prediction being whatever, whatever parameters are of particular interest. And in an estuarine system, that is typically salinity.

So the simulation models predict depth and velocity of movement of water, but they also predict the salinity gradients that would occur in response to different flow regimes.

Q. Now, could you identify the types of computer models that you routinely use?
A. Well, I routinely use a whole suite of simulation models, different ones for rivers and estuaries. In the estuarine system, I typically, or always employ the official model of the State, which is called TxBLEND, to do --
Q. Let me stop you there. The State of Texas has an official model?
A. Yes. The Texas Water Development Board has developed a model over the last, say, 20, 25 years, and it's been developed and refined through that time, but it is the model that is used for doing evaluations of fresh water inflows, among other things. And it is the, it's the tool that went into all of the State studies for fresh water inflows, and it continues to be used throughout the Senate Bill 3 process that Dr. Montagna referred to, and for other purposes.
Q. Now, the TxBLEND model is routinely used in bays and estuaries up and down the Texas Coast?
A. Yes. It's been applied to all seven of the major estuary systems in the Texas Coast, and I believe to some extent to some minor bays.
Q. Now, could you explain to the Court your experience in actually evaluating inflows to bays and estuaries along the coast and the resulting impacts to, for example, salinity?
A. Probably -- I've used the TxBLEND model, I think, in

San Antonio, Galveston, Sabine. And I've looked at some of the results in Matagorda Bay. I was a member of -- I've been a member of two of those BBEST teams, the Bay and Basin Expert Science Teams. And so as a member of the BBEST team for the Galveston-Trinity-San Jacinto group, I employed the TxBLEND model to develop the recommendations that the BBEST group submitted in the report.

Q. Now, so let me understand. You were one of the BBEST -- what does BBEST stand for?

A. It's Basin and Bay Expert Science Team.

Q. So you were chosen --

THE COURT: Wait a minute. I want to write this down.

(PAUSE.)

THE COURT: Okay. Thank you.

BY MR. BLACKBURN:

Q. Now, so you were basically one of the expert scientists that was selected to be on the team for Galveston Bay? Is that right?

A. That's correct.

Q. And were you selected for any other bay systems?

A. I was also selected for the Matagorda Bay system and Colorado and Lavaca River basins.

Q. And what does it mean to be a member of the BBEST team? Dr. Montagna was just talking about that he was a member of the

Science Advisory Commission. What's the relationship of the BBEST team to, say, the SAC?

A. The relationship is the SAC provides guidance to the BBEST team in terms of how to conduct the analyses. The task of the BBEST team -- the BBEST has a one-year time line, and the task is to develop flow recommendations, both for the river sections of those basins, as well as for the fresh water inflows into the bay.

And so this Science Advisory Committee, the SAC, provides guidance in terms of what types of analysis are to be conducted, and also performs a review of the report in their role as a, in their role to support the overall process, the EFAG.

Q. Now, did the Galveston Bay BBEST, as part of its process of selecting computer models to utilize, obtain consultation from SAC member Dr. George Ward?

A. We did. We had a -- the way that process worked is the members of the BBEST team all submitted proposals for how they thought we might best address the issue that we were tasked with. And among those proposals, myself and one of the other team members recommended the use of a salinity zonation approach. And there are a couple of ways to go about that.

We had a, we ended up having a one long day meeting with Dr. Ward, and Dr. Brandis (phonetic), I believe, also participated from the SAC, discussing exactly how to proceed

and whether to use the TxBLEND model.
Q. And what was the recommendation coming out of that meeting?
A. The recommendation was to use the TxBLEND model.
Q. And so has TxBLEND been, TxBLEND, was it the work that you did for the, for The Aransas Project on, in this litigation, did you use the TxBLEND model for that?
A. Yes, I did.
Q. Okay. And could you explain to the Court your understanding of how water withdrawal permits are incorporated into fresh water inflow models and used in, for example, a TxBLEND analysis?
A. Well, the -- there are many inputs into the TxBLEND model, a number of the things that have been discussed. But a primary input is, of course, the inflows. And the inflows are incorporated, or estimated by the Texas Water Development Board. And they use a number of data sources. The primary data source is stream flow collected by the U.S. Geological Survey at river gauges, but they also make adjustments for any alterations to flow downstream of those gauges, so any diversions or returns downstream of those gauges or any rainfall runoff. So any water diversions upstream of the gauges are incorporated into the gauge record, if you will.
Q. And are these records provided by the State as part of the planning process?

A. The records of diversions or the records of flows?
Q. I'm talking about really the record of the historical flows on the river systems.
A. The records on the historical flows in TxBLEND are a part of the input files to that program. So yes, the entire program was provided to the BBEST, the BBEST team, for instance, in the Galveston process.
Q. And --
MR. BLACKBURN: I offer Joe Trungale as an expert in computer modeling of fresh water inflows and bay and estuary responses to those inflows.
MR. RAMIREZ: No objection, Your Honor.
THE COURT: It's granted. Thank you. He's accepted. Thank you.
BY MR. BLACKBURN:
Q. Now, in a very broad sense --
THE COURT: I'm sorry. Just to remind you, if possible --
MR. BLACKBURN: I understand.
THE COURT: I can't give you warning, so if you hear me start barking, stop talking. Thank you.
MR. BLACKBURN: I will do my best.
THE COURT: Thank you. I'm sorry.
MR. BLACKBURN: It's okay.
BY MR. BLACKBURN:

Q. In a very broad and general sense, would you describe the work that you undertook for The Aransas Project relative to the Guadalupe and San Antonio River systems and San Antonio Bay?
A. Yes. In the broadest sense, I used inputs, river flow inputs into the TxBLEND model to predict salinity gradients. I did that --
THE COURT: Into the, what do you call the model again? Tex --
THE WITNESS: TxBLEND.
BY MR. BLACKBURN:
Q. Like T, then X, then capital B-L-E-N-D?
A. Yes. I did that for three different scenarios. So I made adjustments to that, that inflow set. In one of the scenarios I made adjustments to consider the affects of upstream diversions. So I increased the inflow values representing the amount of water that is presently diverted upstream. And if you will, it's not a natural inflow set, but it's a, it's a, takes into account the effect of upstream diversions. So the inflows are higher.
Q. Let me kind of take you through this a little slowly, because --
A. Uh-huh.
Q. -- it gets complicated, and I know I get confused in trying to sort all of this out. We start with what I would call historical, meaning sort of recent history. And that's

the inflows that are provided by the State?
A. Yes.
Q. And these are the inflows, you say, are sort of almost -- whatever is happening on the rivers in 1988, '89, '90, '91, each one of those years, you get flow data for those years.
A. Yes. It's actually daily data I get, but yes.
Q. I'm sorry?
A. It's daily data that's input, yes.
Q. So you get for each day a different flow result.
A. Yes.
Q. And for how many years did you include an analysis of these flows?
A. I believe it's 21 years, 20 -- I think it's 21 years.
THE COURT: Now the flows, those are real flows, not modeling?
THE WITNESS: Those are --
THE COURT: Actual --
THE WITNESS: -- primarily actual flows at the gauge.
THE COURT: Okay.
THE WITNESS: That are recorded at the gauge. There are some adjustments. The gauges are not exactly at the mouth of the river to the bay.
THE COURT: Okay.
THE WITNESS: So there's some adjustments below the gauge, but primarily it's the real gauged, measured flows.

BY MR. BLACKBURN:

Q. But the intent at least is to try to give the best reflection as possible as to what amount of water is at least getting into the mouth of the bay, or the top of the bay.

A. Yes.

Q. And those are files provided by the State?

A. Yes.

Q. Okay. And then for TAP, you made adjustments both sort of back in time and increased the amount of inflow coming into the bay, and then you made adjustments forward in time, where you had full use of all permits?

A. No. It was just full use of six permits in the lower basin, six rather senior permits in the lower basin.

Q. So in the sense of water rights, these are the sort of unused but permitted water rights that are still out there to be exerted that might reasonably be expected to have an impact on San Antonio Bay in the future?

A. Well, they're six of the many of them. There are several hundred, I believe, water rights in the whole basin. But they're just some of them. And yes, it is the unused portion of those six that I looked at and simulated at their full permitted use.

Q. So we've got the historical flows. We take away permit -- now, how did you find out what was allowed to be taken out of the river to add back in to increase the flows going in?

A. Well, the Texas Commission on Environmental Quality maintains a database of water rights. And I looked at the water rights database. It's also included in the water availability or WAM models, the permitted, full permitted amount associated with each water right. So that's the full amount that I had.

THE COURT: So you use the full amount?

THE WITNESS: I use the --

THE COURT: Because the previous witness said that not all of the water permits for like, I don't know, I'm making this up, a thousand barrels a day, aren't actually used.

THE WITNESS: That's right. In the third simulation, I looked at --

THE COURT: Actual usage?

THE WITNESS: -- actual usage of just, just a few of them, a few of the lower ones.

MR. BLACKBURN: I'm not sure y'all are communicating.

THE COURT: Probably not.

MR. BLACKBURN: Let me try it again.

THE COURT: I'm having a hard time.

BY MR. BLACKBURN:

Q. Historical has withdrawals in it. Correct?

A. That's correct. Historical has what people are using every day.

Q. So if I had a permit and it allowed 5,000 acre feet, and I

was taking out 2500, that 2500 taken out would be reflected in those gauged flows and adjusted gauged flows on the historical scenario?

A. That's correct.

THE COURT: How long is the historical? Did you say 21 years?

THE WITNESS: Yes.

THE COURT: So you, the gauge is measured at the mouth of where? Each of the two rivers or --

THE WITNESS: There are gauges at the --

THE COURT: All along the way?

THE WITNESS: There are gauges -- I think it would be helpful, it will be helpful to show the picture of it, but there are gauges at the mouths of the major inputs to this bay system. The gauges, I think the major gauges of concern on the Guadalupe basin are a gauge on the Guadalupe and the San Antonio just before those two rivers come together.

THE COURT: Okay.

MR. BLACKBURN: And could I have Plaintiff's Exhibit 83?

THE COURT: So that's actual flow into the bay?

THE WITNESS: That's correct, Your Honor.

THE COURT: So you have that exhibit that shows historical actual flow into the bay of fresh water? Is it per acre feet? Is that how it's measured?

MR. BLACKBURN: Acre --

BY MR. BLACKBURN:

Q. And by the way, what is an acre foot, just to get that defined?

A. It's a volume of water, and it's the volume of, if you think of a football field being about an acre large, it's the volume of water that would be a foot deep.

THE COURT: On a football field?

THE WITNESS: Yes.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And that's about how many gallons?

A. Oh, I don't have those kind of -- I can't remember those kind of conversions off the top of my head, I'm afraid.

Q. How about 325,000?

A. That works good.

Q. Um --

A. I do CFS and acre feet.

THE COURT: An acre foot is 325,000 gallons?

MR. BLACKBURN: I think roughly. I'll double check it when --

THE COURT: You want me to look on the internet real quick?

MR. BLACKBURN: Sure.

THE COURT: Go ahead.

MR. BLACKBURN: Okay.

THE COURT: 325,851.

BY MR. BLACKBURN:

Q. Let's try another one. You said, "CFS." What does CFS mean?

A. CFS means cubic feet per second. So if you think of a box, a foot tall wide and deep, and it's -- it's actually a flow rate, rather than just a volume. And it's the amount that would pass through a particular point in a second.

Q. So when we talk about the flow that we're looking at, we're talking about it on the Guadalupe and the San Antonio River systems. And are those depicted in Plaintiff's Exhibit 83?

A. Yes.

Q. And now when I was talking, I mean, this is a depiction of permitted water use, at least permits that allow water use or water to be taken out of the river. Is that right?

A. Yes, it is. It's consumptive water rights.

Q. And we will talk about how those were utilized at a later time, but this comes out of -- where do you get this information?

A. Well, here what I'm primarily interested in is the geographical location of these points. I got this information from the water availability models, in combination with that water rights database, that includes the geographical --

Q. And these are existing permits issued by the State that allow water to be taken out of these river systems?
A. Yes, sir.
Q. And so if you were to sum up for any particular historical period the amount of water that was being withdrawn under permit, and then you added that back into the river system, would that be at least an attempt to try to move more toward what the flow into the bay would be if there weren't human usage?
A. Right. That would move you in that direction, would be a reasonable estimate or starting point.
Q. And did you do that?
A. Yes, I did.
Q. And so that's one of your scenarios. We've got historical in the middle. The one where we increase flow -- I'll put that one up here, what did you call that? What term can we use to refer to that as? I know you don't want to call it natural, for some reasons, but --
A. Right. That's the passage of currently consumed water.
Q. The, so we'll call it --
A. That's not a great term.
Q. The passage, no?
A. You know, I use long labels in the report to describe it because I, I want to be clear about what it means. But it is an assumption that water that is currently being consumed is

actually passed to the bay.

THE COURT: Is actually what?

THE WITNESS: Passed. That water is not consumed but left in the river.

THE COURT: Okay.

THE WITNESS: To go down to the bay.

BY MR. BLACKBURN:

Q. And so we're just trying to show that if permits weren't utilized to the extent they have been over this historical time period, it would add water back into the river.

Now, there's a type of water permit or water use that we will discuss probably more with some other witnesses, but there's a class of a, I believe what's called an exempt water right, called domestic and livestock. And what is your understanding of, one, the database about domestic and livestock use in the State of Texas?

A. My understanding is that domestic and livestock use is not reported, and there isn't a database. I don't know of a database for domestic and livestock use.

Q. So when you added water back, did you add any water back for domestic and livestock use?

A. I did not.

Q. So there's at least some amount of use that's out there that could not be added in, added back in because you had no idea what number to put.

A. That's correct.
Q. And you didn't just pick a number and toss it.
A. That's correct.
Q. And then under the full use scenario, what did you do different from the historical scenario?
A. Under the full use scenario, I looked at the number of water rights in the lower basin that have fairly senior priority dates to them, and I looked at how much water they've been reporting that they've been using over the period that I was simulating, and I looked at the difference between the amount they are currently using and the amount they're permitted to use. So if they're currently using 20 acre feet and they're permitted to use 100, I calculated 80 as the amount that they're not using that they are allowed to use, and I subtracted that amount from the inflow to the bay. Therefore, I assumed that they were fully exercising up to the amount that they're currently allowed to --
THE COURT: Okay, so full use.
THE WITNESS: Yes.
THE COURT: And what do you have left over?
MR. BLACKBURN: We'll show you, Your Honor. We'll get to that.
THE COURT: We'll get to the surprise ending another time. Okay.
MR. BLACKBURN: We're going to get to the surprise

ending in a bit.

Table -- let me have Plaintiff's Exhibit 102.

BY MR. BLACKBURN:

Q. Now, on this table, it's your Table 5. It shows for the years 1991 through 2010, it identifies WR permit 5172-5178 reported use. What does that column mean?

A. That's the amount of water that they reported using in those years, under those six permits that are listed there.

Q. So in the historic scenario, this is sort of the input that you subtracted back out to get the pass through?

A. That's correct.

Q. So you would add 46,000 back in if you were doing '91 and a pass-through scenario for that particular group of permits.

A. That's right.

Q. Now, what does the second column --

THE COURT: Wait. I'm sorry. Let me make sure I -- the first column is the actual use. The second column is the permitted use under the permit? And the third is the difference between the two?

MR. BLACKBURN: The un, yes, the unused section.

THE COURT: Is that right?

THE WITNESS: Yes, Your Honor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. So then 1991, for example, there is a reported use -- and

by the way, is that self-reported or is that checked by the State?

A. That's self-reported to the South Texas Water Master at Texas Commission on Environmental Quality.

Q. So there is a reported use of 46,318 acre feet?

A. Yes, sir.

Q. And then there is a right under -- and actually those are permits Number 5172, 3, 4, 5, 6, 7, 8?

A. Yes, sir.

Q. And under those permits, there is a total right to take out how much?

A. 172,000.

THE COURT: Well, I can read all that.

MR. BLACKBURN: Good. So you got it.

THE COURT: I got it.

MR. BLACKBURN: Okay, cool.

THE COURT: But what do we do with it?

MR. BLACKBURN: Well, we --

BY MR. BLACKBURN:

Q. Tell me what you did with it.

A. Well, in the first scenario, the pass of current use, I added that amount of water back into the flow.

THE COURT: Column one.

THE WITNESS: Column one. And again, in the first scenario, I did that for all of the water use in the entire

basin.

In the middle scenario, I just used the data directly from the State. And then in the third scenario, I subtracted from the inflow the amount in the third column, the amount of water that is permitted but currently hasn't been used. It's something of a look into the future.

BY MR. BLACKBURN:

Q. Now, those are how you set up your three scenarios. Is that right?

A. Yes, sir.

Q. Now, what I'd like to do is talk about, a bit about the modeling that you did with TxBLEND.

MR. BLACKBURN: Exhibit 77, please.

BY MR. BLACKBURN:

Q. This looks amazingly like an exhibit that Dr. Montagna put up. Could you describe what Figure 1 shows?

A. Yeah. This is the original figure from the Alber paper. What it shows is the conceptual model of sort of estuarine response to inflow. So inflow affects estuarine conditions, which in turn affect the resources.

MR. BLACKBURN: Okay. And if I could have Exhibit 79, please.

BY MR. BLACKBURN:

Q. Now, can you explain to me, and I'm not sure how well it shows up on the monitors. Ooh, that's faded out a bit. I'm

not sure if the ELMO would be better on that or not, but --

THE COURT: It's a little bit better on the screen.

MR. BLACKBURN: Do you want to try the ELMO, or is that good enough for you to see, Your Honor?

THE COURT: Try the ELMO, see if it's better. Could you flip it, Ms. Gano? You want to zoom it up and see if that helps? What do you think?

MR. BLACKBURN: I think that's much better.

BY MR. BLACKBURN:

Q. Now, Mr. Trungale, can you describe, from a geographic standpoint, what we're looking at here?

A. Well, this is the Coastal Bend estuaries that we, Dr. Montagna described that's the Matagorda Estuary in the east, north, and then you move down to the Guadalupe Estuary, the Mission and Copano, Aransas-Copano.

Q. Do you have a pointer up there?

A. Uh-huh.

Q. Could you show us the San Antonio Bay system and the Guadalupe Estuary in this?

A. (Witness complies.)

Q. So that's -- do you know where the wildlife refuge is generally?

A. Wildlife refuge is right around here.

Q. Down in there. Well, what are these two big blobs going out, where the arrows are pointing?

A. Those are the connections with the Gulf.

THE COURT: Those are the pass-ways that Dr. Montagna talked about, about how the crabs had to move in and out?

THE WITNESS: Yes, Your Honor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And so why do you put, why do you put those on this system?

A. Well, this is, this is again the model from the Texas Water Development Board to simulate salinities in the system. And in order to understand -- and they use it really primarily for the San Antonio and the Mission-Aransas Estuaries. But you need to have the boundary conditions, the sea water side of the equation, and also the bays on the north, northeast and southwest, to properly simulate what the conditions in those two middle bays are.

Q. So if you want to know the salinity changes in San Antonio Bay, do I have to cover all that real estate?

A. Well, I think to do it properly, they certainly determine that that's what's necessary to properly evaluate what's going on in San Antonio Bay. It's certainly affected by inflow or tidal exchange with the Gulf.

Q. Now, there are some points, let me see if I can just hone in a little bit. I'm beginning to kind of hone in a bit on the San Antonio Bay system, and there are some green dots that are

shown on this, on this diagram. Could you explain what those are?

A. The green dots are what we'd call control points to the model. So they're the nodes that are used in the model where the inputs from the river are fed into the model.

Q. Now, in running your model for the simulation of San Antonio Bay, did you change all the green dots?

A. No. The only, the only modification I made at all to the official state model was to change the dot where it says "Guadalupe" there.

Q. Could you point to that, please, sir?

THE COURT: I can see it.

MR. BLACKBURN: You can see it. You got it. Good.

BY MR. BLACKBURN:

Q. Okay. So that's sort of your input for the fresh water inflow that we're going to be talking about?

A. Yes, sir. I might also add that those are the two gauges that Your Honor was asking about, the one on San Antonio and the one on Guadalupe, and there's also one on Coleto Creek. So those are the USGS gauges.

THE COURT: Thank you.

MR. BLACKBURN: And could I have Exhibit 80?

MR. WAITES: I'm sorry, what?

MR. BLACKBURN: And we'll try it without -- 80. We'll try it without the ELMO, and then if we need the ELMO.

And could we, could we just hone in on that, try to cut it closer to the four different areas? There, that's good.

BY MR. BLACKBURN:

Q. Now, this is a map that you prepared, and could you describe the purpose of this kind of set of maps and what your point is in looking at these different areas?

A. Yes. What I was doing here was trying to define the geographic scope of my analysis. So that very large four or five bay model that you saw in the previous picture, although it's necessary for properly evaluating salinity conditions in San Antonio Bay, what I was interested in the modifications to the flows at that Guadalupe point don't affect salinities over that whole area. So I was trying to determine what area would I expect sort of a reasonable or significant impact of changes to inflow from the Guadalupe. So I looked at a couple of different options.

Q. And just quickly, I mean, the one on the top left covers, it looks like, the entire area from about Port O'Connor down to, oh, the, I guess the far south end of the refuge.

A. Yeah, that's from the State's study for fresh water inflow needs to San Antonio Bay, and that's the geographic area they selected.

Q. And then the next area that's shown on the right is what? Top right.

A. It's the designated critical habitat area for the whooping

crane.
Q. And that comes from whom?
A. From the U.S. Fish and Wildlife Service.
Q. Okay. And then there's some, looks like a bunch of, kind of dark areas along the, next to your colors.
A. Right. Those are the winter territories.
Q. So those would be the territories of the whooper, whooping cranes that we've had discussion about today, for example.
A. Yes, sir.
Q. And then down on the bottom left, what have you got?
A. Well, I also considered the area that was of significant concern to the BBEST project in this basin. I should also note that the Guadalupe-San Antonio BBEST group also used the TxBLEND model in developing their recommendation. And they focused on where the primary oysters are in San Antonio Bay, and that's sort of the oyster pentagon there that they --
Q. That would be the green area that's shown?
A. Yes, sir.
Q. And then finally, this is what, the full model running?
A. That sort of covers San Antonio and Mission-Aransas.
MR. BLACKBURN: And Exhibit 81, please.
BY MR. BLACKBURN:
Q. And is this what you decided upon?
A. Yes, it is.
Q. So in the analytical results that we will be seeing, is

this the geographic area that you used?
A. Yes, it is.
Q. And --
THE COURT: Outlined in black?
THE WITNESS: No, it's everything that's in color there.
THE COURT: Everything that's in color.
THE WITNESS: So it is --
BY MR. BLACKBURN:
Q. And what is the area that's outlined in black?
A. It's the designate critical habitat area for the whooping crane.
Q. So basically you took the designated critical habitat and then just extended it all the way to Port O'Connor and the pass, or up to the edge of the pass there, and then back up to the top of the Guadalupe Bay system.
A. Yeah. I took the area that the State used in their evaluation of fresh water inflow needs for San Antonio Bay, and I added the designated critical habitat area to that.
Q. So just for display purposes, it would give us an idea of how this was relating to whooping crane territories.
A. Yes, sir.
Q. Okay. Now --
MR. BLACKBURN: Plaintiff's Exhibit 82, please.
BY MR. BLACKBURN:

Q. Now, what are you, what are you showing here? We see the designated critical habitat and the bay system, and then it looks to me like there's, what, two green dots and two red dots?

A. Yes, sir.

Q. What are those?

A. Well, the green dots are the long-term salinity monitoring stations in San Antonio Bay. These, these measurements are taken instantaneously or every 15 minutes they monitor what the salinity is in the bay at those locations.

THE COURT: Who does that?

THE WITNESS: The Texas Water Development Board.

And then the red dots are a couple of more recent salinity monitoring stations, GBRA 1 and GBRA 2, that have been in place over the last several years. And they all monitor the same thing.

THE COURT: So I guess everybody recognizes that it's a big issue, salinity?

THE WITNESS: Yes, Your Honor.

BY MR. BLACKBURN:

Q. This isn't some hidden issue that we've just sprung on the Court here?

A. No. The State has been working on understanding the fresh water inflow needs for Texas bays for decades. They've spent millions of dollars on it in developing things like this model

and the monitoring system that Dr. Montagna talked about. We have perhaps the most complete coastal monitoring system in the world in Texas. We've spent a lot of time and effort into it.

Q. So --

MR. BLACKBURN: If I could have Plaintiff's Exhibit 84, please.

BY MR. BLACKBURN:

Q. Now, take a little time and explain what's being shown here.

A. Okay. This is a --

THE COURT: Did you say in the world?

THE WITNESS: I think so. I mean, it's --

THE COURT: Okay.

THE WITNESS: It's often recognized as a really amazing data set, particularly the bag seine and the trawl seine collections that we have in Texas.

THE COURT: Okay. Thank you.

BY MR. BLACKBURN:

Q. So on what has been marked as Plaintiff's Exhibit 84, could you explain, first of all, what's on the left-hand side?

A. So the vertical axis there up and down says,"Salinity PSU," and that's the -- all of this data is from the monitoring site at the GBRA 1 location. And it is the salinity measurement taken at that sonde is what's depicted on the Y axis, the salinity axis. And then along the X axis, the

horizontal axis, that is a measurement of the cumulative inflow in the previous 28 days. So --

THE COURT: Is this Exhibit 82?

MR. BLACKBURN: It's Exhibit 84.

THE COURT: 84. Thank you.

BY MR. BLACKBURN:

Q. Now, I guess on the one, we've heard a lot of talk about the fact that inflows and salinity are related. But what does this graph show you?

A. It shows me that when inflows are low, relatively lower, salinities are relatively higher. And as inflows go higher, salinities are relatively lower.

Q. And there's something called an R square there that's shown up in the top right-hand portion?

A. Right.

Q. What's an R square?

A. An R square is a measurement of how well, how related the two variables are, how much of the variation is explained by this relationship.

Q. Now, what I'd like to do is just ask you a couple of questions about using models?

THE COURT: Just a second.

(Court and Clerk conferring off the record.)

THE COURT: Go ahead.

BY MR. BLACKBURN:

Q. What does the term "calibration" mean to you?
A. Well, in developing models, what you want to do is have a model that predicts what you observe. Calibration process, in many models, there's many variables that can be adjusted. The calibration process is adjusting some of these variables within a range of options such that the outputs of the model accurately predict what is observed.
So in the case of a salinity circulation model, the primary inputs are the bottom roughness and the dispersion of water through the, through the system. So these are parameters that can be adjusted, such, so as to make the model accurately predict what's observed.
Q. So basically, there's a set of mathematical formulations that attempt to describe the natural system's performance?
A. That's right.
Q. And there are some points that can be adjusted within that mathematical system? Is that fair?
A. Yes, it is.
Q. And so is calibration the actual process of making the adjustments to the model such that it kind of fits as best it can?
A. Yes.
Q. And with regard to TxBLEND, in the model that you used, who undertook the calibration of the model that you used?
A. The Texas Water Development Board calibrated that model.

Q. So basically, you've got a model that was calibrated?
A. Yes.
Q. Now, I ask you a separate question with regard to validation.
A. Uh-huh.
Q. Is validation a different process than calibration?
A. Yes, it is.
Q. And what is the difference between validation and calibration?
A. Well, when you calibrate a model, you make these adjustments to these parameters and you have this set of observed data. You make the adjustments to the parameters to try to predict those observed, those observations. When you validate a model, you make no adjustments to any of the parameters, and you use an independent set of data and see how well the model predicts data that it was not calibrated to. So it's a check on the accuracy and the certainty of the model results.
Q. Now, there is a --
MR. BLACKBURN: Plaintiff's Exhibit 85, please.
BY MR. BLACKBURN:
Q. Now, what is -- and I have lost track on my notes as to whether this is a calibration or a validation run.
A. This is a calibration run.
Q. This is a calibration run. So would you explain what a

calibration run, or really explain what's shown on Exhibit 85.
A. Sure. What you're seeing here is a time series trace of salinity at the Mesquite Bay sonde, which was one of the points on the map that we looked at earlier.
Q. In fact, Mesquite Bay is right there in the middle of the Black Jack Peninsula and the Matagorda-San Jose kind of intersect. Right?
A. That's correct.
Q. So it's right there at the refuge?
A. That's right. The blue dots are the measurements that were observed from the sonde. They were actual data. They're the salinity measurements. The red line is the prediction by the model as to what the salinities would be at those times, based on the inflows and the other meteorologic inputs.
Q. And Exhibit 85 says, "From Texas Water Development Board 2010." So is that the, essentially the report from the calibration run from the Water Development Board?
A. Well, actually the 2010 report is the calibration and validation report. But this figure is -- the way the calibration and validation worked is they developed the model using data from 1987 to -- I can't remember exactly what the date is, but somewhere in the mid to early '90s, and that's the calibration period of record. And then they used the data from the mid 90s to current to validate the model. So what we're seeing is a portion of it that's for the calibration part.

MR. BLACKBURN: And then if I could have Plaintiff's Exhibit 86, please.

BY MR. BLACKBURN:

Q. And what does Plaintiff's Exhibit 86 show?

A. So this is again very similar information, it's the same kind of information, but here the green points are from, and all of this data are from another sonde, the GBRA 1 sonde, which is a more recent sonde. And this is the simulation that compares the observed data to the model outputs, without making any adjustments to any of those parameters.

Q. So for both the calibration and validation runs, was the accuracy acceptable?

A. It was. And again, this comes from the State official report that evaluated the calibration validation effort and determined that it was sufficient for the kinds of uses that myself and the BBESTs have used recently for this model.

Q. And now I'd also like to ask that Exhibit, Plaintiff's Exhibit 91 -- so is this essentially the area that you laid out and undertook the evaluation on?

A. That's correct. I mean, to produce the results, the TxBLEND model was run over the entire domain, entire range from Matagorda to Corpus. But I only analyzed the results for this subset of the model outputs.

So at each one of those red dots, nodes, the model produces a estimate of the salinity for every time step in the

simulation. So the simulation's run for 21 years or 23 years, and it, for every day, it actually runs on a 30-minute time step. So it takes about a week to run, and it produces an output for each node saying what the salinity is on those days and averages them by month.

Q. Now, did you complete simulation modeling for the time period from May 2008 to April 2009 using the TxBLEND modeling, or model, and using the three different scenarios that we talked about?

A. Yes, I did.

MR. BLACKBURN: And could I have Plaintiff's Exhibit 92, please. And probably going to have to tighten in on the first, first probably six, and then we'll do the second six.

BY MR. BLACKBURN:

Q. So can you explain what the colors mean on this graph, on this depiction?

A. The colors indicate the salinity predicted by the model. So the greener colors are fresher, lower salinities. The redder colors are saltier, higher salinities. And they're in bins of 5 PSU. So every color change is from -- so the darkish green are 0 to 5. The next one's 5 to 10, and so on.

THE COURT: So what's red?

THE WITNESS: It's 30 and above. Yeah, greater than 30.

BY MR. BLACKBURN:

Q. Essentially, the redder, the darker -- as you move from yellow to -- yellow is, I think, 15 to 20. Is that right?
A. Yes.
Q. And orange is 20 to 25 parts per thousand, and then the various shades of red move into the 25 to 30, and then greater than 30. Is that right?
A. Yes.
MR. BLACKBURN: And could we have the second set as well?
BY MR. BLACKBURN:
Q. And just showing that over the course of this, this drought, putting back the permitted flows, the bay's still hit pretty hard, isn't it?
A. That's correct. I mean large portions of the bay are within the range of 20 to 25, and even higher.
Q. And once again, I would ask you, are any domestic and livestock uses put back in?
A. No, no domestic and livestock.
MR. BLACKBURN: Now, let's go to Plaintiff's Exhibit 93. And tighten in on the first group. And I think probably the easiest way to do this, Your Honor, is just go through and show you these depictions. They will get increasingly more red as we basically take more and more water out of the system.
THE COURT: I figured that.
MR. BLACKBURN: Good. Then let me move on. Exhibits

93 and 94 take the three scenarios into some detail.

THE COURT: This is the surprise ending.

MR. BLACKBURN: Can we go to Exhibit 95, please.

BY MR. BLACKBURN:

Q. Now, for the period from, in this case, November of '07 through December of '09, so basically encompassing that whole time period, what are you showing on this graphic?

A. What I'm showing is the percent of that area that falls within the different bins of salinities that I'm looking at.

Q. Now, you're talking about "that area." What are you talking about?

A. The study area that I defined, the San Antonio Bay plus the designated critical habitat area.

Q. So we have percent on the vertical axis. What is that?

A. It's the percent of the overall area, the geographic scope that I defined, that is within the different bounds. So for instance, in the very first month, about 20 percent, or a little less than 20 percent of the bay has salinities less than 5 PSU.

Q. And then --

A. And about 50 percent of the bay is 5 to 10. Less than 30 percent is above 10.

Q. So, and this was not shown on those earlier graphics. This goes a little further back in time when there was a lot more rain. Is that right?

A. That's correct. This period of record kind of is the beginning and end of the 2008-2009 drought.
Q. And so basically what you see is the progression of the drought as essentially you move from November of 2007, with I guess, what, November of '08 sort of being in the middle?
A. Yes.
Q. And then over to December of '09. And that gives you an idea about the percentage of the bay covered during that time period.
A. That's correct.
Q. So these, when Dr. Montagna talked about zones of salinity, are these salinity zones?
A. That's correct, yes. This is a very accepted common approach in doing these kinds of analyses.
Q. So this is where you put the flows back in.
MR. BLACKBURN: Could I have Plaintiff's Exhibit 96.
BY MR. BLACKBURN:
Q. Now, what is shown on Plaintiff's Exhibit 96?
A. This is the historical inflows. So these include the effect of upstream diversions. You see, you know, in that period of fall of October '08 to spring of '09, the sort of oranger area starts to take over more of the bay area. So more of the bay area is greater than 25 parts per thousand, as a result of the decreased inflows.
Q. And then would you go to Plaintiff's Exhibit 97? And this

is full use of the current -- full use permit scenario, which includes the use of the, that set of permits in the lower basin.

A. That's correct.

Q. And once again, the amount of red continues to increase and covers much of this area?

A. That's correct.

MR. BLACKBURN: Now, could I have Plaintiff's Exhibit 106, please.

BY MR. BLACKBURN:

Q. Now, what is shown in Plaintiff's Exhibit 106?

A. This is, shows the percent of the area that has salinities less than 25 PSU.

Q. Now, Dr. Montagna was talking about for blue crabs 25 PSU and lower being the area, the range that he said would be preferred.

A. That's correct.

Q. Is that the same units that you're talking about here?

A. Yes, it is.

Q. So May of '08, how much of the bay -- how much of this area, the designated critical habitat plus the area going up to where the inflow comes into the bay, how much of that area is below 25 parts per thousand?

A. Under all scenarios, a very large percentage, 80 to 90 percent of the bay.

Q. So there's still a fair amount of water coming in here?
A. That's right. This is just coming off of a high flow period.
Q. Okay. June of '08, what happens?
A. You start to see a bit of a departure between the three scenarios. As less water is going into the bay under each scenario, you start to see less of the bay within that sweet zone that Dr. Montagna discussed.
Q. But we're still talking in June of '08 --
A. Still significant areas.
Q. -- even under the full use scenario, 66 percent of the bay is still below 25,000 -- 25 parts per thousand?
A. That's correct.
Q. Okay. We move into July of '08, and we go from 60 percent under the put back scenario, to 19 percent under the full use.
A. Right. You're seeing the effect of not only less inflow in the current month, but the fact that there had been less inflow in the month before, so it's kind of compounding the problem as you have these longer durations of low flows, lower flows.
Q. So let's go down to, say, October of '08. Under the put back scenario, and again, not including domestic and livestock, how much of the bay system is below 25 parts per thousand?
A. Right, 35 percent.
Q. And full use scenario knocks that all the way down to

what?
A. 6 percent.
Q. And the historical knocks it down to 9. Right?
A. That's correct.
Q. Now, this is the geographic area that is covered as a percent of the bay. How much acreage are we talking about?
A. The study area acreage is about 52,000 hectare, and it's 210 square miles, something like that. I don't have all the numbers right.
Q. So if you go from -- how much square miles?
A. About 210.
Q. You're looking at 31 percent of, or 35 percent of 210. It's going to be, oh, I don't know, what, about 73? Something like that?
A. Uh-huh.
Q. So essentially 73 square miles is still acceptable to blue crabs under that scenario, with the put back water. And if you reduce that all the way down to 6 percent, that's 6 percent of 210, which would be, what, about --
A. 18.
Q. 18, something like that?
A. Yes.
Q. So we're talking significant reduction in square, is that square miles?
A. Square miles, yes.

Q. Of the bay system under the full use scenario.
A. Yes.
Q. Now, do these different reported scenarios essentially demonstrate the impact of permitted withdrawals on inflows to the bay system?
A. These demonstrate the effect of permitted withdrawals on salinity conditions in the bay system, yes.
Q. And based on this, do you have any doubt that permitted withdrawals can alter salinities?
A. No, I have no doubt that less inflow means higher salinities, and reducing the inflow will increase salinities.
Q. And the difference between the historical flows and the full permitted flows basically shows if just six or seven permits were fully utilized, it would have a tremendous impact, and those are already issued. Right?
A. Those are already issued, and there are lots of plans out there to use that water on a continuous basis. I should also say those, there are no special conditions, restrictions, anything, because they are very senior water rights, so they can use that water and not leave anything in the river.
Q. And what do you mean, no conditions?
A. Well, since the mid 1980s, I think, the TCEQ has routinely included special conditions in water permits that require them to -- maybe "require" is too strong -- but would require the water user to restrict diversions, given special conditions.

And so if they determine that 100 CFS needs to stay in the river to keep things healthy, your water permit is limited to making diversions when flows in the river drop below that level.

The permits that I'm looking at here were granted in the middle of the century, '50s, I think, and at that time there were no special conditions included in those water permits. So there's no regulatory requirement that would prohibit them from using every drop in the river if their, if the flow in the river was less than the amount that they're allowed to permit.

MR. BLACKBURN: Now, I'd like to turn to Plaintiff's Exhibit 89.

BY MR. BLACKBURN:

Q. And I'm going to ask you to take your time and try to explain what you're showing here.

A. Okay.

Q. I would, I would identify that you are stating, or at least the title of this figure is frequency of drought conditions, assuming various, your three various inflow scenarios. Now, how have you defined drought?

A. Okay, the values I used to define drought are the numbers that were recommended by the State in their study of the fresh water inflow needs for San Antonio Bay. Those are the values on the top horizontal axis there, and those are values of acre feet per month. So the State conducted a study over a number

of years. The Texas Parks and Wildlife Department produced a recommended flow that would maintain the health of the system, and that was a number of about 1.1 million acre feet per year, coincidentally very similar to what the BBEST report just recently recommended.

THE COURT: Recommended.

THE WITNESS: Yeah. It has a monthly distribution, so there's more water needed in the wetter seasons, and it can be less water in the drier seasons.

And so what I did was I looked at what the State said was needed in each of the months, and then for the period of record that I looked at, the 19 years, I looked at how often within each month flows were less than that amount under the three scenarios. And that's what the three bars are. So what you see on the vertical axis is the count or number of times the flow in a given month was below the target.

BY MR. BLACKBURN:

Q. So even under the put back water in the river scenario, we're going to be short of what would be desirable?

A. Yes. And that's very much acknowledged in the State study. Drought is something that's part of a natural system here, and you don't hit the targets every time.

Q. So we're starting off with a target that's going to be tough to hit under best conditions?

A. That's correct.

Q. And, but what do your different bars show?
A. They show an increase in the number of times that you fail to meet the target under the increasing use of water.
Q. And this is over a how many year period?
A. This is over a 19-year period.
Q. And that would include several years of drought in there?
A. That's right. It would include certainly the 2008-2009, the '89, '88-'89 drought, and a number of droughts.
Q. But you are defining drought in this case to mean not meeting those targets?
A. That's correct.
Q. So if we look at January, you've got three bars there. They're all the same.
A. That's right. In January, you had six times under all three scenarios when flow in those 19 years was less than 111,000.
Q. Now, let's go to February. What does February show?
A. February shows that you have an increase in the frequency of these low flow conditions, as more water is used. So under the historical condition, you have 11 times where you fail to meet that target. But if there had been no diversions, you would have only had 9 out of 19. And then if there are diversions, additional full use of these select permits, there would be an increase in the number of times you fail to meet the targets.

Q. And so could you -- March only has two bars.
A. That's right. In March, under -- if there was no water being diverted under any of these water rights, it would be sufficient water to meet the target all, in all 19 years.
Q. So even in our -- good. So March would be worsened by the use of the permits?
A. Yes.
Q. How about April?
A. It's worsened by the current use of water, but a full use would not cause additional violations.
Q. Across this entire graph, is the pattern consistent?
A. Yes, it's very consistent. The more water that's used, the more times you fail to meet the fresh water inflows that the State has determined that are necessary to protect the sound environment.
MR. BLACKBURN: Now, could I have the Plaintiff's Exhibit 375? Oh, I'm sorry, we need to offer Plaintiff's Exhibit 375.
MR. TAYLOR: Can we get a copy of it?
THE COURT: Yes, sir.
(Counsel conferring off the record.)
MS. ROBB: I have no objection.
THE COURT: No objection?
MS. ROBB: No objection, Your Honor.
THE COURT: 375 is admitted, without objection from

Ms. Robb.

(Counsel conferring off the record.)

BY MR. BLACKBURN:

Q. And what I'd like you to do on 375 is just, let's not talk about the charts right now, but let's just go to the graphic. And this is a different scenario. Could you explain why you prepared this scenario?

A. Yes. The State recommended flows for San Antonio Bay were derived through a long process that used lots of different analysis. There's been some critiques of these estimates, and that process developed a number of sets of flows that they considered in making their determination.

One of the sets of flows is called the Min Q-Sal, and that's the minimum inflow that's necessary to maintain only the salinity objectives of the study. The other evaluation considered other factors. But this number considered only salinity.

Q. So the total amount of fresh water inflow wasn't up in the 1.1 million, but was dropped substantially. Right?

A. That's correct.

Q. So about how much fresh water inflow is contemplated in this scenario?

A. You know, I don't have that number on the top of my head.

Q. But if you added all the numbers across the top, that would be it?

A. Right. So in the other one in January, the recommended flow was 111,000 acre feet, and here it's 52,000 acre feet.
Q. So somewhere in the neighborhood of, I don't know, 10, 12 times 50 --
A. 52.
Q. 12 times 60?
A. Yeah.
Q. 700,000 acre feet, 800,000, somewhere in that range?
A. Something like that.
Q. And what you're showing here, your same three water inflow scenarios, but it looks quite different. Can you explain what's happened?
A. Well, you have less times under all three scenarios that you violate the target. I mean, if you'll note, the Y axis, the vertical axis, the scale only goes up to 8 here, whereas it went up much higher. So you have, in all three scenarios, you have less times where you've failed to meet the target, because it's a lower target.
THE COURT: So what can be done about it? I mean, you're the water resource person. How do you get the 1.1 million acres of fresh water every year?
THE WITNESS: So what the -- you don't. What the State found in their --
THE COURT: So it can never happen?
MR. BLACKBURN: Probably never get that, but we can

sure make some progress toward that.
BY MR. BLACKBURN:
Q. For example, if you just didn't use the fully permitted amount, would that help?
A. Certainly, would reduce the times where the red bar is higher than the black bar.
Q. If you asked everybody to reduce water use during times of drought -- we'll show you some information tomorrow that actually water usage figures go up during times of drought. During times of drought, we use more water. Is that right?
A. That's what the data I looked at indicates.
THE COURT: That makes sense actually, because --
MR. BLACKBURN: Well, it does make sense, but --
THE COURT: You're watering your yard more, and you're doing all these other things. Right?
BY MR. BLACKBURN:
Q. But the curtailments, you know, and the restrictions that Dr. Montagna was talking about, yard watering, things like that, those -- and perhaps over a period of time, changing landscaping concepts, those are the types of things that through a process could be developed. Are those the types of things that could be effective?
A. Yes, they could.
MR. BLACKBURN: And we'll come back with some more ideas, but may we adjourn for the day?

THE COURT: Thank you. Yes. I didn't want to wimp out first.

MR. BLACKBURN: Well, I tell you, I'm about -- I'm almost shivering up here.

(Proceedings concluded at 5:53 p.m.)

I, court approved transcriber, certify that the foregoing is a correct transcript from the official electronic sound recording of the proceedings in the above-entitled matter.

/s/ Molly Carter
Molly Carter

January 27, 2012
Date

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IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	*	CIVIL ACTION
PLAINTIFF,	*	CA-C-10-075
VS.	*	
BRYAN SHAW, ET AL.,	*	CORPUS CHRISTI, TEXAS DECEMBER 8, 2011 8:35 A.M.
DEFENDANT.	*	

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TRANSCRIPT OF BENCH TRIAL - DAY 4

BEFORE THE HONORABLE JANIS GRAHAM JACK
SENIOR UNITED STATES DISTRICT JUDGE

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PROCEEDINGS RECORDED BY ELECTRONIC SOUND RECORDING
TRANSCRIPT PRODUCED BY TRANSCRIPTION SERVICE:
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ALSO PRESENT:	MR. TODD CHENOWETH MR. BILL WEST MS. SUZANNE SCOTT

(The proceedings began at 8:35 a.m.)

(Call to Order of the Court.)

THE COURT: Sorry for the delay. Let's see. You want to start back with the witness? Y'all can be seated.

MR. BLACKBURN: Please, Your Honor. Joe Trungale, please.

THE COURT: Okay, I hate to tell you, but you need to start with the exhibit that had the three lines, the red, start over with that.

MR. BLACKBURN: The three lines with the red?

THE COURT: The black, and one of them had nothing.

MR. BLACKBURN: Right. I understand. That's a hard exhibit, and --

THE COURT: I think my mind was kind of wandering at the end of the day.

MR. BLACKBURN: Well, I understand. I was very cold and shivering over here, so it wasn't the best. But if I, may I come to that later?

THE COURT: Yes. Anyway you want to do it. I just hate to admit you have to do it again.

MR. BLACKBURN: I understand. And actually, I'm thinking that perhaps that's just too hard of an exhibit, and I might just frankly not necessarily withdraw it, but just not push it.

THE COURT: Well, what I might do, I was thinking

this morning on the way in, things that I need more help with, I may have you all do some post-trial briefs.

MR. BLACKBURN: That would --

THE COURT: Particularly that series of the water that he was doing yesterday. Also, in my notes, I'm not making proper notes about -- I got the whooping crane, the international whooping crane, the international crane group and --

MR. BLACKBURN: Foundation.

THE COURT: Yes. I'm getting the different organizations mixed up.

MR. BLACKBURN: Yes, Your Honor.

THE COURT: So if you all could tell me who was in what, and what the names are again.

MR. BLACKBURN: Okay. And we're certainly happy --

THE COURT: I'm just going to start making notes of what I need more explanations of.

MR. BLACKBURN: That would be great. And we'll be happy to --

THE COURT: Is that okay?

MR. FERNANDES: Your Honor, and we were going to suggest at the end of the trial as well that if we had an opportunity to go through the transcript, and then propose findings of fact --

THE COURT: This is going to be months, I can tell

you.

MR. FERNANDES: Yeah, yeah. And then whatever guidance you give us before that briefing would be helpful in connection with that.

THE COURT: That would be great.

MR. BLACKBURN: And we're certainly willing as well, Your Honor, so --

THE COURT: Okay.

MR. BLACKBURN: I had it explained to me that perhaps it was not absolutely clear what we were saying, so --

THE COURT: Well, and I was nodding, pretending like I was following it, and that's always dangerous.

MR. BLACKBURN: Well, sometimes when you, when I nod and you know, I see you nodding, I just kind of think we should move on, so --

THE COURT: That was nodding off, but not quite.

MR. BLACKBURN: It's a misinterpretation. I understand.

JOE TRUNGALE, PLAINTIFF'S WITNESS NO. 8, SWORN

DIRECT EXAMINATION (Continued)

BY MR. BLACKBURN:

Q. Okay. Let's go back a little bit, Mr. Trungale, if we may.

MR. BLACKBURN: Could I have Plaintiff's Exhibit 378? And this is a new exhibit, Your Honor, and it's compiled from

others. I've talked with opposing counsel, and I believe it's unopposed, so I'll offer Plaintiff's Exhibit 378.

MS. ROBB: No objection, Your Honor.

THE COURT: Thank you, Ms. Robb. Go ahead. It's admitted. Sorry.

BY MR. BLACKBURN:

Q. Now, Mr. Trungale, I had showed you a set, a series of maps that you've prepared that have 12 maps to a page, and we kind of flew through it rather quickly, and those, for the record, were Exhibits 92, 93 and 94. And there was a sequence of three maps. And what we've done is we've pulled the map for December 2008 and have put it up here with the three different scenarios. Mr. Trungale, would you explain, starting in the middle, and talk about the terminology, the assumptions that were made, and then what the differences are in these diagrams, please.

A. Yes. So all three of the diagrams show the salinity -- all three of the diagrams show the salinity patterns in the bay study area that we were working on. The middle panel shows the salinities predicted when the actual historical inflows were simulated. These are the, basically the gauge data.

Q. And this is the gauge data from essentially the time period, November/December 2008, and so it is a -- is it or is it not a fair approximation of what actually happened?

A. Yes. These are what the model says actually were the

actual salinities in December 2008.
Q. And these are again the models that are the official models of the Texas Water Development Board?
A. That's correct. These are the models that they would produce the exact same results if they did the simulation. I made no changes at all to the official state model.
Q. And with regard to the 20 to 25 part per thousand salinity line, where does that essentially, where is that on this map?
A. Well, the, this kind of orange right here is salinities in the range of 20 to 25,000 (sic). So the break between 19.99 and 20 is where the orange and the yellow are. And the break between 24.99 and 25 is this break. So this is the 25 -- this is less than 25 parts per thousand, and going that way. This is more than 25 parts per thousand in the lower part.
Q. Now, you performed a simulation where you took away the reported permitted withdrawals that were withdrawn under TCEQ permit in this actual scenario. Is that right?
A. You're talking about the middle panel?
Q. I'm sorry. Would you explain what you did on the far left panel?
A. Yes, sir.
THE COURT: That's if there were no diversions?
MR. BLACKBURN: Permitted diversions.
THE COURT: No permitted diversions. Of course, the livestock and the domestic don't count.

MR. BLACKBURN: Excellent.

THE WITNESS: That's right. So --

THE COURT: I pass?

MR. BLACKBURN: You pass.

THE COURT: Thank you.

THE WITNESS: Right. This panel shows what the predicted salinities would have been if flows, if diversions had been passed down to the bay. So you see that this area that is less than 25 parts per thousand is significantly larger because there's more inflow coming in because it's not being diverted.

BY MR. BLACKBURN:

Q. And then you --

A. So the bay is fresher.

Q. And then you have a panel over on the far right-hand side.

A. Right. And the far right-hand side, I looked at the six lower basin senior water rights, and I added the effect of diverting the full permitted amount. So I looked at how much they're currently diverting, and I added whatever additional they are permitted to divert, thereby lowering inflows and getting a much, much more bay of the area that is greater than 25 parts per thousand. The break between 24 and 25 is now way up here. And really none of the main bay in this future scenario, if you will, has salinities less than 25 parts per thousand.

Q. And if I were to represent to you or ask you to assume that there would be a new permit application coming in, and it would be sort of tacked on today, would that be in addition to what is shown in the panel on the far right?

A. Yes, it would. And of course, it would be that plus all of the other full use that I have not simulated in this. This is a very conservative future scenario, because it only considers the six permits. So you are correct, though.

MR. BLACKBURN: Could I have Exhibit 90, please.

BY MR. BLACKBURN:

Q. Now, there is a vertical axis that looks like percents and a horizontal axis here that looks like years. Could you explain what you're talking about in terms of percents, to begin with?

A. What I'm talking about in terms of percents is the percent of our study area that had salinities within the bins that are represented by those colors. So if you look on the far left, where the green takes up a large part of the vertical line, that means that a significant area of the bay was relatively fresher, lower salinities. If you look in the 2008-2009 period, over at the other end, this means that a significant area of the bay had salinities greater than 25 parts per thousand, or it's very salty. And you can see the pattern of really dry periods, with very high salinities, and relatively wetter periods with lower salinities.

Q. And if I were to represent to you that whooping crane mortality was relatively high during 1988-'89, '89-'90, and '90 and '91, could you locate those, those kind of three winter time periods on the chart and discuss how that fits in with your percent of the bay concept?

A. Right. So 1989 and '90 is this period here. Large percentages of the bay had salinities -- and I would like to back up just a little bit, because we've talked about these three scenarios. This is actual historical gauged flow. This is the middle panel.

Q. So this is, as best as we can do, a replication of what happened.

A. That's correct. And we didn't mention it, but the black line is the inflow, and that's represented by the other axis. So you see inflows --

THE COURT: Okay, wait a minute.

THE WITNESS: Sorry.

(PAUSE.)

THE COURT: Okay, thank you.

THE WITNESS: So you see when there's very high inflows, large percentages of the bay are fresher, and these lower periods, '88-'89, you had very low inflows, large parts of the bay were very salty. Same thing in 2008-2009.

BY MR. BLACKBURN:

Q. And then look at 2008-2009 time period, and identify that

as well, please.

A. 2008 and 2009, again, very low inflows, very large percentage of the bay that's in the red. That's very high salinities, very salty.

Q. And, and I'd like to turn to Plaintiff's Exhibit 96, please. Could you take us through an explanation of this graphic?

A. So this is again one of the historical middle panels. This is the actual flow that went into the bay. So this is the model's representation of what actually happened. For this period of record from November of 2007 to December 2009, that period started off relatively fresh. It had been higher flows before that.

As the summer goes on in 2008 and we get into the fall season of 2008, this is that time where, listening to Mr. Stehn the other day said, right around in October/November, we started to see effects of this higher salinity condition. And you see that going on here, that a large part of the bay is now experiencing salinity conditions greater than 25 parts per thousand. And that --

THE COURT: Did you tell me you had a wolfberry expert?

MR. BLACKBURN: No, Your Honor.

THE COURT: Okay.

MR. BLACKBURN: We can get some of that through

cross-examination if they bring forward some of their experts, but no, we do not have a wolfberry expert.

THE COURT: Is it disputed that wolfberries need salinity, need a certain level of salinity?

MR. FERNANDES: It's not disputed that salinity --

THE COURT: The higher the salinity, the worst the wolfberry crop?

MR. FERNANDES: It's not disputed that salinity impacts blue crab, I mean wolfberry availability and abundance, but there is no science on what levels of salinity would have such an impact. And it's --

THE COURT: I guess direct observations would count, wouldn't it?

MR. FERNANDES: Well, I don't know that there's even that. What you heard from Mr. Chavez-Ramirez, those observations were in February, when the crop was already past --

THE COURT: Well, I heard from Mr. Stehn, I think yesterday, that starting in that fall period, the wolfberry crop was not as abundant as it had been, that it just covered the bay, and it didn't this '08-'09 year.

MR. BLACKBURN: Absolutely, Your Honor.

MR. FERNANDES: We have, we have his surveys of wolfberry abundance for each of the years that we've put in the record.

THE COURT: Thank you. I'll review, I'll read all of them. Obviously you all know I have not read these exhibits. I'm watching the ones you put up, and I'm going to, it's going to take me a long time to review all of this.

THE WITNESS: I guess I would like to just finish with this figure here. You notice that at the end of 2009, although it had been very low flows in that summer, by the fall flows had come up considerably, and you see the response in salinities. The salinities were actually, or the bay was relatively fresher in the fall of 2009 period.

BY MR. BLACKBURN:

Q. And there's testimony that we've heard that it was expected that perhaps the fall and winter of 2009-2010 was going to be bad, that perhaps the crabs weren't available. And then all of a sudden, it seemed like the birds didn't die that winter. Can you correlate your salinity predictions with that observation?

A. Well, clearly the salinity projections show that in the fall that the bay was fresher, because the flows had come up. It had been really low in the beginning, in the summer.

Q. Now, just in terms of the modeling of the responses, does an amount as small as 25, 50,000 acre feet make a difference?

A. It certainly appears to make a difference, because it has kind of a compounding effect, that when you, when you have low flows in one month, that means the salinities are lower than

that month, or raised in that month. Then in the next month, if you again have a low flow, if you extend the duration and frequency and the severity of the drought, and really severity and the duration of the drought, you see that effect compounding itself. So I haven't, I haven't done sort of the repeated analysis to try to find out exactly what the number is. But you certainly see an effect from the kinds of diversions we're seeing.

Q. Now, have you had the opportunity to be involved in any permit proceedings of the TCEQ where a concept of a salinity trigger was incorporated into a permit condition?

A. Well, I'm familiar with them. I wasn't directly involved.

Q. So you've analyzed and reviewed it?

A. That's correct.

Q. And what is a salinity trigger?

THE COURT: A what?

MR. BLACKBURN: Salinity trigger.

THE COURT: Okay, thank you.

THE WITNESS: I think what that means is that it's a, it's a level that salinity reaches when there's some kind of action taken, some kind of accounting taken for it.

BY MR. BLACKBURN:

Q. So how would a salinity trigger work? For example, we've talked a lot about 25 parts per thousand. Let's say if we were trying to protect for 25 parts per thousand, let's say a

trigger was set at 15 to 20 parts per thousand. What would that, how would that be implemented, in your understanding of that concept?

A. One way it might be implemented is like a drought contingency trigger that you, that you routinely see in Texas. When reservoir levels get below a certain trigger, they start to ask for voluntary reductions in use. And then when it gets to another trigger, there's a call for perhaps mandatory reductions in use. I think that's kind of the concept.

Q. But the idea would be that there's some kind of red flag that goes up as an indicator from the physical system that there's something out here that is now kind of requiring attention and that there are responses that are triggered?

A. That's correct.

Q. And are there gauges in San Antonio Bay that would record this, that record salinity?

A. There are, yes.

Q. Now, I'd like for you to --

THE COURT: Do other places have those kind of triggers?

THE WITNESS: Yes, they do.

THE COURT: Where?

THE WITNESS: Well, very recently, there was a permit issued by the TCEQ that includes triggers like that for Matagorda Bay for a specific permit, where there's a concept

called a cumulative salinity depletion, I think, where there's a trigger, and they, when, once salinities reach a certain level, they start counting the number of days it's above that level and by how much. And when that, when they get to a certain value, there are some management --

THE COURT: What, I mean, what value did they set? Do you know?

THE WITNESS: It was -- I don't recall exactly. It wouldn't be exactly the same value that -- it depends on how far in the bay you are --

THE COURT: Okay.

THE WITNESS: -- where your station is, so you need to think about it specifically for your place. But I think it's in the 20ish range. It's the kind of thing we're talking about here.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. But the concept, at least, is not foreign to the State of Texas?

A. No.

THE COURT: But they can't, what about the permits that are already issued? You can't, can you add new triggers? Is the law, would the law allow that? I know the State's going to tell me that it's not allowable.

MR. BLACKBURN: Well, we have a witness coming up

that, that will at least address that, to the extent that Your Honor would like to hear that.

THE COURT: Well, I would. It was kind of the crux of your --

MR. BLACKBURN: I understand.

THE COURT: -- redressability issue. Right?

MR. BLACKBURN: It is. And that's why he's being brought.

THE COURT: Okay.

MR. BLACKBURN: So he will come up today, Your Honor.

THE COURT: Thank you.

MR. BLACKBURN: Could I have Exhibit 23, please?

THE COURT: And I'm not indicating I'm going to do it. I just want to know how, what cases and what you're asking me to do --

MR. BLACKBURN: I understand. We'll try our best to kind of --

THE COURT: -- besides tell everybody to change their gardening habits and --

MR. BLACKBURN: I --

THE COURT: -- put in xeriscaping, xeriscape gardens.

MR. BLACKBURN: Xeriscape? I guess that's my personal hobby horse there. I --

THE COURT: Close down all the nurseries.

MR. BLACKBURN: You know, if you -- I'm smiling

because my colleagues chastise me about my landscaping suggestions, but these are all aspects, I think, that we are going to have to consider.

THE COURT: Well in, you know, in Scottsdale and Phoenix, that's, everybody --

MR. BLACKBURN: That's right.

THE COURT: Nobody has green grass. It's just unheard of, unless you're the Biltmore or something.

MR. BLACKBURN: And that's the type of situation, Your Honor, that I --

THE COURT: And it's a water use situation.

MR. BLACKBURN: It is. And I mean, I think that it has to do, over time, with how we're going to be adjusting.

(Counsel conferring off the record.)

MR. BLACKBURN: Now --

THE COURT: Okay.

MR. BLACKBURN: I'm going to be jumping around just a little bit, Your Honor, because I'm trying to kind of go back and --

BY MR. BLACKBURN:

Q. This is a map, it's Exhibit 83, that is a diagram that you created. Is that right?

A. Yes, it is.

Q. Now, what I'd like you to do, if you would, is just to describe the two river systems, the Guadalupe and San Antonio

River system, just trace them on this map. It's not labeled, so --

A. Okay. The Guadalupe starting here, goes up here, around this way, over here. This is Canyon Lake area right here.

Q. Stop there. So there is a reservoir at Canyon Lake.

A. That's correct.

Q. And keep going, please.

A. This is sort of the upper Hill Country area.

Q. So the Kerrville area --

A. Uh-huh.

Q. -- back up in there?

A. That's correct. Comfort, and that's the headwaters up there.

Q. And then San Antonio River?

A. San Antonio is here. I'm guessing that around there somewhere is the city of San Antonio. I'm not sure exactly. And then goes up -- you know what, my geography gets a little bit lost in this --

THE COURT: Probably in the middle of all the reservoirs.

THE WITNESS: Yeah, somewhere up in that area.

BY MR. BLACKBURN:

Q. And the red dots are permitted withdrawals?

A. That's correct. The red dots represent permitted withdrawals that are water use types, municipal and industrial,

irrigation or mining.

Q. And when we've been talking about the impacts of these permitted withdrawals, it's been the consumptive aspects of those withdrawals that are shown in both the actual use, which would be their reported withdrawals, and then at least in the bottom the projection of those six bottom permits being fully utilized. Is that right?

A. Right. Those sizes have to do with the full permitted amount. But for my simulations, I was only, except for those six, was only concerned with the actual reported.

Q. Now, in terms of domestic and livestock, if I were to represent to you --

THE COURT: Tell me what "domestic" means exactly.

MR. BLACKBURN: Domestic --

THE COURT: I just assume that when San Antonio, the municipal system withdraws, has their permit, I'm making this up, this is what my thought is, that it includes the water that goes to houses.

MR. BLACKBURN: Right. And that's a permitted withdrawal, and that is not covered by domestic and livestock.

THE COURT: What is domestic then?

MR. BLACKBURN: Domestic --

THE COURT: The water wells?

MR. BLACKBURN: No. No. Domestic and livestock is use that -- you have to own a piece of property adjacent to a

river to have this right. And it actually comes out of the riparian rights system.

THE COURT: That's common law. Right.

MR. BLACKBURN: That's common law. It was -- and Mr. Soward will discuss this in more detail than I'm probably capable of, but the riparian system was in existence under Texas law long ago. That riparian system was incorporated into the permitted system in 1967, and an exemption was written into the law from the permitting requirement for domestic and livestock usage.

In this context, "domestic and livestock" means if you own a piece of property adjacent to a river, that you have the right for your own domestic use and for watering livestock, and domestic use would include --

THE COURT: To divert the water.

MR. BLACKBURN: To take water out of the river and use it.

THE COURT: Irrigate your property.

MR. BLACKBURN: Irrigate your property.

THE COURT: Feed your livestock.

MR. BLACKBURN: If you have pecan trees --

THE COURT: Is somebody saying "no" over here?

MR. BLACKBURN: Did I misstate, Matt?

MR. WILLIS: Well, Your Honor, I think there's -- I'm going to let him go on, because he's giving his version of it,

and he's pretty close to it, and I think he's right, Mr. Soward will address it. We've got -- I'm sitting on my hands over here, but we've got witnesses that --

THE COURT: You don't have to.

MR. WILLIS: Well, I think we've got witnesses that will be, that would give a better explanation.

THE COURT: I mean, I don't want to be led astray early on, so you might as well.

MR. WILLIS: I understand. In fact, I was going to point out actually now, and I'm not trying to trip up Jim, but it might be better after this witness if we kind of move the witnesses around a little bit, because it's clear that I think that when you've got witnesses talking about such things as D&L exemptions, some other aspects of the TCEQ water program, I think it might be a good point to educate the Court on some of those issues a little bit better. So we'll just talk about that after this witness. But I mean, I think it would probably help.

MR. BLACKBURN: There's a sequence of witnesses that are coming, some of whom are adverse witness, and in some respects we're trying to help with timing and things like that.

MR. WILLIS: Absolutely. He agreed to take a witness earlier today that was trying to get out of town. So I wasn't trying to insinuate --

MR. BLACKBURN: But it is the, we have a lot of

ground to cover, much of which is going to be agreed to, and a whole lot, you know, that will be disputed. If we could get the agreed parts agreed, that would be lovely. But we'll see.

THE COURT: Well, the other thing is, whatever you agree to, you have to make sure I understand what it is.

MR. BLACKBURN: Well, I'm not -- we haven't been real successful in agreement yet, but it may be forthcoming in some amazing feat, so -- at any rate, to be honest -- do you want to go back to that table, or would you rather have the table covered in briefing?

THE COURT: How about briefing it?

MR. BLACKBURN: That would be excellent, Your Honor.

THE COURT: I don't want to glaze over like I did --

MR. BLACKBURN: You will. And I think I will, too. And Joe --

THE COURT: But if I can look at it in leisure with an explanation, I think it would be helpful.

MR. BLACKBURN: It might be. I will pass the witness.

THE COURT: Thank you. Ms. Robb, you may proceed.

MS. ROBB: Thank you, Your Honor.

CROSS-EXAMINATION

BY MS. ROBB:

Q. Good morning, Mr. Trungale.

A. Good morning.

Q. Now, to look at -- I just want to make sure that I'm clear on your testimony yesterday. To look at the effects of inflows on salinity, you ran three scenarios in a model. Right?
A. That's correct.
Q. And one assumed no diversions from the river. Correct?
THE COURT: Except for livestock and domestic, I think.
MS. ROBB: Right. No permitted diversions from the river. That's right, Your Honor.
THE WITNESS: That's correct.
BY MS. ROBB:
Q. And so that assumes no agricultural or industrial activities other than domestic and livestock unpermitted.
A. That's right. I looked at the water use types, and I excluded everything that was municipal, industrial.
THE COURT: I understand if you're trying to -- that is totally impractical. That will never work. But I think he was just doing a progression. That's the way I interpreted it, if that's helpful to you at all.
MS. ROBB: Yes, Your Honor.
BY MS. ROBB:
Q. The second assumed current actual diversions.
A. That's -- well, it was the actual data from the State, yes.
Q. Right.

A. And those do assume actual diversions.
Q. And then the third, you added to the actual diversions the full use of existing water rights for six permits that you picked.
A. That's correct.
Q. Okay. And in your study, you define drought as any time that the flows fall below 1.15 acre feet?
THE COURT: Say that again? Any time --
BY MS. ROBB:
Q. Any time the flows fall below 1.15 acre feet.
THE COURT: A day?
THE WITNESS: So I defined it based on the results of the State's Freshwater Inflow Needs Study, which defines the flow needs for San Antonio Bay as 1.15 million acre feet per year.
BY MS. ROBB:
Q. Right.
A. And it has a monthly distribution to it. That's correct.
Q. Right. I think I neglected the "million" in my question.
A. Yes.
Q. Thank you for correcting me.
THE COURT: That's why I wondered if it was a day. I didn't know what you were talking about.
MS. ROBB: No. No. Sorry. Sorry. I just misspoke.
BY MS. ROBB:

Q. And we call that, that's the FINS study. We refer to that as the FINS study.
A. Yes.
THE COURT: How do you spell FINS?
MS. ROBB: All caps, F-I-N-S.
THE COURT: Thank you.
MS. ROBB: It's Freshwater Inflow Needs Study.
BY MS. ROBB:
Q. And that's a state study.
A. That's correct.
Q. Yeah. From 1998?
A. I believe that's the correct year, yes.
Q. Right. And the SB 3 process has been designated to set a bay specific environmental flow number for the estuary that we're discussing in this case. Right?
A. It has, as did the FINS study, yes.
Q. Let's look at Plaintiff's Exhibit 83, your map of water rights in the Guadalupe and San Antonio River basins. We were just looking at this when you were talking at last with Mr. Blackburn. And I know it says it in the legend, but I'm not sure we talked about it. You show the permitted amounts in acre feet per year on that map. Correct?
A. That's correct.
Q. All right. Before we get to your model, let's talk about the factors that you believe impact salinity. Your opinion is

that salinity in the estuary is primarily driven by fresh water inflows. Right?

A. That's correct.

Q. And you also agree that tidal exchange is another dominant factor. Correct?

A. Yes.

Q. And you also agree --

THE COURT: Slow down.

MS. ROBB: Sorry.

THE COURT: Sorry. Okay. Go ahead.

BY MS. ROBB:

Q. You also agree that evaporation affects salinities?

A. Yes, I do.

Q. And wind?

A. It affects --

THE COURT: Sort of the same thing. Right? Wind for tides and evaporation?

MS. ROBB: They're all different --

THE COURT: Okay.

MS. ROBB: -- climatological factors.

THE WITNESS: I agree wind would affect the salinity distributions or gradients, yes.

BY MS. ROBB:

Q. And do you agree that temperatures affect salinity?

A. I heard yesterday somebody answer that and say,

"Indirectly." I'm not sure how that --

Q. Yes.

A. I'm sure --

Q. That was Dr. Montagna.

A. I imagine it must. I imagine he's right about that. I'm not thinking right now how temperatures affect salinity.

THE COURT: The other one was the oxygen thing.

MS. ROBB: The dissolved oxygen issues.

THE COURT: Dissolved oxygen.

MS. ROBB: That's right.

BY MS. ROBB:

Q. Okay.

A. So temperature -- yeah, I'm not sure how temperature affects it, but it probably does.

THE COURT: He had that chart up there with the blue lines going this way.

THE WITNESS: Right. But the temperature -- I'm sorry, Your Honor, but the temperature there was really an indication of the seasonality and that there was a relationship --

MS. ROBB: Mr. Trungale, I'm sorry, I can't hear you.

THE WITNESS: Oh, I'm sorry.

THE COURT: He's just talking to me.

MS. ROBB: As he should.

THE WITNESS: I thought the temperature was a

reflection of the seasonality and that it was related, but there's a sort of seasonal pattern of salinities.

THE COURT: Like the temperature of the water, I think he's talking about, not the outside temperature. Well, I guess it would be related.

THE WITNESS: It is, but I'm not sure that there's sort of a direct -- I don't quite understand what the direct relationship between temperature --

BY MS. ROBB:

Q. So you have no opinion about whether temperature affects --

A. Let's say that.

Q. All right. Now, the opinions you're giving today, the testimony that you're giving are based on the model runs that you've done, in part?

A. Yes.

Q. And you've issued three versions of your report on those runs, haven't you?

A. I believe that's correct.

Q. And in each of those reports, you changed your run results, didn't you?

A. That's correct.

Q. But in all those reports, your opinions were identical, weren't they?

A. That's correct.

Q. Now, let's talk about those opinions. You haven't independently studied what whooping cranes eat, have you?
A. No, I have not.
Q. All right. And you haven't done any studies about 23 parts per thousand as a threshold for salinity for drinking water for whooping cranes?
A. No. I've only read that.
Q. Okay. You concluded, based on your study, that diversions of fresh water inflows significantly affect San Antonio Bay's salinity. Correct?
A. That's correct.
Q. Let's talk about the diversion data you used in your study. The diversion of fresh water inflows that you used does not take into account water previously stored in reservoirs, does it?
A. That's correct.
Q. So the water is stored in reservoirs for later use in a drought if needed, as part of regulatory planning. Right?
A. That's my understanding, yes.
Q. And in determining the diversions of fresh water, you counted diversions of stored water as though they were fresh water inflows, didn't you?
A. Well, I didn't make any --
THE COURT: What's the difference?
MS. ROBB: Well, Your Honor, the -- perhaps

Mr. Trungale ought to explain to us what the difference is, between stored water and fresh water inflows.

THE COURT: Aren't they both fresh?

MS. ROBB: Well, they're fresh in the context that they're not --

THE COURT: That they're not --

MS. ROBB: -- saline.

THE COURT: Okay.

MS. ROBB: Yes, Your Honor. But the stored water could have been put into a reservoir years before, and Mr. Trungale's report looks at actual diversions on, in a time defined period.

So taking out stored water from 2004 and saying that it wasn't counted --

THE COURT: Okay. I got it.

MS. ROBB: Okay.

THE COURT: I got it. So you're saying the diversions weren't for use, they were for stored water.

MS. ROBB: That's right.

THE COURT: But I'm not -- okay, tell me what the —

MS. ROBB: So he's overcounted --

THE COURT: The diversions?

MS. ROBB: -- the diversions, yeah.

THE COURT: I don't see how, if they were actually diverted, and then put back in at another time, they were still

diverted.

MS. ROBB: Well, the issue is --

THE COURT: Okay, I'm slow. Walk me through it again.

MS. ROBB: No, Your Honor, you're not slow. The problem is that if you put water into a reservoir in 2004, and then you're doing a study of the year 2008 and you are saying that the diverted water that should have gone to the bay --

THE COURT: Okay, now I've got it.

MS. ROBB: Thank you.

THE COURT: I've got it. That affects two of his three models.

MS. ROBB: Yes.

THE COURT: I think.

BY MS. ROBB:

Q. Do you agree with that, Mr. Trungale?

A. No. I would say it is possible it affects one of my models.

THE COURT: Tell me which one.

MS. ROBB: And which one would that be? Excuse me.

THE COURT: Here we go.

THE WITNESS: It potentially affects the, what the flows would have been if diversions had been passed. It is unlikely that it --

THE COURT: Okay.

THE WITNESS: -- affects the, what the flow might be if those six lower basin water rights are fully exercised.

THE COURT: I got it.

BY MS. ROBB:

Q. I have a question about what you just said, and that is: Didn't you use the historical scenario and simply overlay the full use of the six permits that you selected?

THE COURT: Let me ask this. Did any of those six permits have to do with water going to reservoirs?

THE WITNESS: I do not believe they do, and that's why --

THE COURT: So that's the big issue, right --

MS. ROBB: Yes, so --

THE COURT: -- in your, in your cross-examination?

BY MS. ROBB:

Q. You're saying that incrementally the third scenario did not add reserved water?

A. Right, and all of the --

Q. All right.

A. -- upstream stuff was part of the gauge data.

Q. All right.

THE COURT: Does that make sense?

MS. ROBB: It --

THE COURT: I think I've got it.

MS. ROBB: Right.

BY MS. ROBB:

Q. Let's talk about consumptive use and how you dealt with that in your study. You adjusted the estimates of fresh water inflow to reflect the effect of upstream diversions for consumptive use. Right?

A. That's correct.

Q. And could you just talk for a minute about what we mean by "consumptive use"?

A. Well, it's probably easiest to -- in the TCEQ water rights database, there is a code associated with each permit that says what the type of use is. And those codes are things like municipal, industrial, irrigation, mining. Those are typically, those are what I consider to be consumptive uses.

Other uses include hydropower, which is just water that passes through the turbines but isn't taken out of the river, recreational use. There are a couple of other categories or types. Those I did not count because that is not water that's taken out of the river. It's a use of water that remains in there.

THE COURT: Okay, like recreational -- okay. Wait a minute. Consumptive water, consumptive use takes the water. Right? And it disappears.

THE WITNESS: It is used.

BY MS. ROBB:

Q. Let's pull up Plaintiff Exhibit 100. This is your Table

3, which has the water use types that you were just talking about, isn't it, Mr. Trungale?

A. That's right. So like navigation is another one that I didn't --

Q. So to do your study, you made diversion assumptions based on, based on the types of use in this table. Right?

THE COURT: What's the exhibit number?

MS. ROBB: 100. Plaintiff's Exhibit 100, Your Honor.

THE COURT: Plaintiff 100.

BY MS. ROBB:

Q. So Table 3 reflects that any water rights permits with use codes that you've listed 1 through 4, which are municipal, domestic, industrial, irrigation, that's Number 3, and mining, Number 4, you assumed those were all consumptive use?

A. That's correct.

Q. But permits for diversions can provide for return flows to the river. Correct?

THE COURT: So 1 through 4 you're saying he says are, takes the water completely.

MS. ROBB: That's exactly right.

THE COURT: I have to differentiate. I mean, each of these are uses, but they're not necessarily takings.

MS. ROBB: Well --

THE COURT: So your point, you're going to tell me that 1 through 4, they don't necessarily take.

MS. ROBB: Right. This is just a code, this is a code that's applied to a particular permit --

THE COURT: Okay.

MS. ROBB: -- for a facility. So a particular facility could fall into the industrial code, but it could, in its permit, or in its operation, have return flows going back to the river as part of the permitting process.

THE COURT: Is somebody going to tell me how like water treatment plants in cities take, put the water back in and how that works with the original taking?

MS. ROBB: Yes, Your Honor, we can do that.

THE COURT: Okay. Thank you.

MS. ROBB: So --

THE COURT: Is it significant or insignificant?

MS. ROBB: Well, it depends on the case that you're looking at. It's fact specific.

THE COURT: Well, I guess water, I guess I assume water treatment plants just take water back into the municipality that has them.

MS. ROBB: Right. Some operate differently.

THE COURT: So if you take water out of a water table of whatever, out of a river, and use it for the sewer system, and then it goes back into treatment, it goes back into the same system.

MS. ROBB: It goes back into the river, and some of

these are called "treated effluent discharges." And this is the point that I'd like to discuss a little bit more with Mr. Trungale.

THE COURT: I wondered if that's what you were getting at. Okay, thank you.

MS. ROBB: Because, because he treated it differently in his study.

THE COURT: Okay.

BY MS. ROBB:

Q. So permits, Mr. Trungale, let's just recap this conversation we just had. The permits for diversions can provide for return flows. Correct?

A. That is correct. However, I've reviewed probably hundreds of permits, and it is very rare that I've seen a requirement of water dedicated to return flows. It's a, sort of an emerging issue right now. But most of the permits granted in Texas don't have requirements for return flows. And water that's diverted becomes the water of the water right holder. They're not required to return flows.

Q. Well, do you know how many water right -- do you know how many water rights permits have been issued in Texas, give or take?

A. In the entire state, I don't have a number like that.

Q. Does 625 sound about right?

A. No.

THE COURT: Say at that again.

MS. ROBB: 625.

THE COURT: 625?

MS. ROBB: Yes.

THE COURT: That's it?

BY MS. ROBB:

Q. Does that sound about right? No, okay.

A. No, it sounds very, very low.

Q. It sounds low?

A. Yes.

THE COURT: Is that what it is?

MS. ROBB: I -- you know what, we have a number of people in the room who probably know the exact number. Do you?

THE COURT: Anybody know the exact number?

MS. ROBB: Perhaps I was wrong about that. We'll find out and get back to you about it.

THE COURT: Okay.

MR. WILLIS: We'll find out.

MS. ROBB: Yeah, yeah.

THE COURT: Well, I mean, we ought to know. Right?

MS. ROBB: We absolutely ought to know.

BY MS. ROBB:

Q. In that case, well, the permits for diversions, did you look at the permits in putting together your study to determine whether there were return flows in the permits that you were

dealing with in your study?
A. No, I didn't. I mean, there are certainly over 300 permits in the Guadalupe and San Antonio basin. There are, I did not go through and do a permit-by-permit evaluation. "No" is the answer.
Q. All right. So let's assume for a moment that some of the permits allow for or require a return flow.
A. Uh-huh.
Q. In that case, some of the water originally diverted from the river is returned after use. Right?
A. Yes. I certainly address that in my report and talk about it.
Q. And that water is put back, correct, not consumed?
A. That's correct.
Q. Okay. And also some of the operations of the facilities that are included in the codes 1 through 4 also result in return flows that may not be reflected in the permits?
A. That's correct.
Q. All right. And the State has developed a water availability model, which we called a WAM, to take the consumptive use information for individual permits into account, hasn't it?
A. Yes, it has. And as a --
THE COURT: Say that -- water what? I'm sorry. Water, it's called what?

MS. ROBB: It's called a water availability model, and we talk about it as a WAM.

THE COURT: Okay. Thank you. Go ahead. I'm sorry.

THE WITNESS: Yes. As a matter of fact, I developed the input file for the original WAM for the Guadalupe basin. And there is a model. It covers the period of record from the 1930s up until 1989. So it doesn't extend to the period that is of concern in this proceedings.

BY MS. ROBB:

Q. Well, you've worked previously with the WAM. Right?

A. Extensively.

Q. Absolutely. And you, you did a similar study in connection with the Exelon proceeding for an early site permit, didn't you?

THE COURT: Exelon, is that the nuclear --

MS. ROBB: The nuclear --

THE COURT: Okay.

MS. ROBB: -- plant site proceeding.

THE WITNESS: Yes, I did.

BY MS. ROBB:

Q. And did you use the WAM in that?

A. Yes, I did.

Q. You agree that Texas water permits are based on a prior appropriation system. Right?

A. Yes, I do.

Q. And "prior appropriation" means that the most senior water right holders take priority over junior holders in low flow situations. Correct?
A. That's correct.
Q. One scenario you looked at in your study considers the impact if specific downstream senior water rights were fully used. Correct?
A. Yes.
Q. That's the third, where you added the six permits. Right?
A. Yes.
Q. You didn't consider in your study in that scenario how prior appropriation would affect diversions by senior water rights, did you?
A. Well, to the extent that I selected those six permits, that was considering that. If I had selected much more junior water rights, then it's more likely that other senior water rights would have had an effect on that. But since I selected these water rights that are very senior in this basin, it's unlikely that upstream water rights would have affected their ability to divert.

And in any extent, they would have only limited their ability to divert as flows got lower. But these senior water rights would still be able to capture what's, what's down there. So I feel like I did consider it in selecting just these six and not looking at every, the full appropriation of

every water right in the basin. That's kind of why I did that.
Q. Well, when you ran that third scenario, you assumed that the junior water rights could divert before, after or at the same time as the senior water right. Correct?
THE COURT: I don't understand that. Do you understand that?
THE WITNESS: Um, when you're referring to the junior water rights, you're referring not to the six that I used?
BY MS. ROBB:
Q. Did you account for the senior water rights taking priority over the junior water rights when you ran that scenario?
A. That's a complicated question. I did not reduce upstream junior water rights in situations where they would have had to pass water for these six select water rights.
Q. So the answer to my question is "No" --
A. That's correct.
Q. -- "I did not."
A. That's correct.
Q. That's right.
MS. ROBB: Could we pull up Plaintiff's Exhibit 378, please.
BY MS. ROBB:
Q. Now, this is the exhibit you were just looking at with Mr. Blackburn.

A. Yes, it is.
Q. These three figures are averages for a year. Correct?
A. No, they're monthly.
Q. You just picked out December?
A. That's correct.
Q. Okay. I see that it says "December 2008" on the top.
A. Yes.
Q. I apologize.
MS. ROBB: All right. And can we look at Plaintiff's Exhibit 94.
BY MS. ROBB:
Q. Now, this is your figure 18, and it is also monthly, and it's got all of the months.
A. That's correct. The December 2008 is the right-hand panel in the previous.
Q. Right. But here on Plaintiff's Exhibit 94, you've got "May 2008 through April 2009." And this is with the full permitted water rights, with the six additional permits that you considered that's that third scenario. Correct?
A. Yes, it is.
Q. And taking a look at your figure here, how many months out of the year are there salinities greater than 25 parts per thousand within the area that you studied?
A. All of those months have salinities greater than 25.
Q. So there are 12 months?

A. Yes.
Q. Let's look at Plaintiff's Exhibit 93. And here again, you've got May 2008 through April 2009 by month. And this is what you call the historical inflows. So it was the actual flows at the time.
A. That's correct.
Q. How many months out of the year are there salinities greater than 25 parts per thousand within the area of study?
A. There's going to always be, every month there's going to be, the areas adjacent to the ocean are going to have salinities above 25,000, in every year, in every month.
Q. So just to --
A. Yes, all of them --
Q. -- complete that thought --
A. Sorry, 12. 12 is the answer.
Q. But to complete your thought, let's look at Plaintiff's Exhibit 92.
A. Uh-huh.
Q. And again, this is no diversions whatsoever, except unpermitted domestic and agricultural. And under that scenario, how many --
A. All 12 months.
Q. Let me just finish the question so the record's clear.
THE COURT: Please.
BY MS. ROBB:

Q. How many months out of the year are there salinities greater than 25 parts per thousand within the refuge?
A. Twelve.
MS. ROBB: I have no further questions and pass the witness.
THE COURT: Thank you. Oops.
MR. RAMIREZ: Your Honor.
THE COURT: Is that some sign?
THE WITNESS: I hope so.
MR. RAMIREZ: Your Honor, I wonder if I could ask the witness just a question or two on this domestic and livestock exemption.
THE COURT: Yes.
MR. RAMIREZ: Thank you.

CROSS-EXAMINATION

BY MR. RAMIREZ:
Q. Good morning, Mr. Trungale.
A. Good morning.
Q. I just wanted to clarify for the Judge this domestic and livestock exemption that you were talking with Mr. Blackburn about. What is your understanding of the domestic and livestock exemption?
A. Really not much, other than that there were no reported domestic -- actually, there was one reported domestic and livestock in the South Texas Water Master reportings of water

use that I reviewed.
Q. But do you know what the limitations on domestic and livestock exemption are in the Texas Water Code?
A. No, I do not.
Q. So would it surprise you to learn that the domestic and livestock exemption is limited to 200 acre feet per year?
A. I have heard that number before, and I've heard other things before. So it's -- no, I guess it wouldn't surprise me.
Q. And that's from the Texas Water Code Section 11.142?
MR. BLACKBURN: And Your Honor, we will talk a lot about this with other witnesses, but we somewhat dispute what Mr. Ramirez just said, so --
THE COURT: What did you say, Mr. Ramirez, that the --
MR. RAMIREZ: That the domestic and livestock exemption, first of all, is limited to 200 acre feet per year, that it's limited to a landowner who owns property adjacent to a river.
THE COURT: This, I think that's agreed.
MR. RAMIREZ: Yeah, but especially on the use, if I may, Your Honor, because you had asked for clarification earlier. A domestic and livestock user can use that water only for his or her domestic purposes. So, for example --
THE COURT: Right, not sell it.
MR. RAMIREZ: And not sell it. Also cannot use it

for commercial irrigation.

THE COURT: Okay.

MR. RAMIREZ: Watering livestock, yes.

THE COURT: Okay.

MR. RAMIREZ: Irrigating for commercial purposes, no.

MR. BLACKBURN: And we, there being -- this is a tricky area, and we will spend some time on it, Your Honor.

MR. RAMIREZ: And so will the State, when it puts on its case. But we just wanted to make sure that was clarified for Your Honor.

THE COURT: Let me write it down. Okay, thank you. Are we finished with this gentleman? Do you have more questions, Mr. Blackburn?

MR. BLACKBURN: Just a couple.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. In terms of the scenarios that you looked at, given the things that -- going to the, what I'll call the removal of the permitted flows to try to come up with a flow that is more like what natural conditions might have been, the pass-through scenario. Do you feel like, from a standpoint of the amount of water that you projected coming to the bay, is that a conservative or is it a liberal estimate of those, what those inflows would be, given the availability of the data?

A. I think it's a fairly conservative estimate. There's some

factors that would cause it to go up and other factors that would cause it to go down. It's not extremely precise, but it seems very much in the range of what I would expect to see.

Q. But you didn't make estimates about things that there was not data about. Is that fair?

A. That's correct. I couldn't calculate the storage depletion from available data.

Q. And was there any data on return flows?

A. None made available to me.

Q. And were there any data on the domestic and livestock withdrawals?

A. It's my understanding that there is no data in that area.

Q. So you feel like on balance, more or less conservative?

A. Yes.

Q. And with regard to the questions Ms. Robb was asking you about every month has got 25 parts per thousand --

THE COURT: I got that.

MR. BLACKBURN: You got it? Then I'm through.

THE COURT: It's all up there.

MR. BLACKBURN: Pass the witness, Your Honor.

THE COURT: Any other questions? Ms. Robb?

MS. ROBB: No, Your Honor.

THE COURT: Mr. Ramirez?

MR. RAMIREZ: No, Your Honor.

THE COURT: Mr. Ramirez, one -- thank you, sir.

You're excused. One point about the, you know, by statute, the limitation, there's no way to check on that, is there?

MR. RAMIREZ: Well, there is a way to check on it. Whether it's being checked on, I don't know. But it's always possible to --

THE COURT: Well, who would know? I mean, how would you go out and monitor how many acres of feet --

MR. BLACKBURN: The next witness, Your Honor.

THE COURT: Okay.

MR. WILLIS: We're going to do that.

THE COURT: Goodbye. Thank you.

MR. RAMIREZ: But it can be metered.

THE COURT: Okay. Sorry.

MR. WILLIS: Could I visit with Mr. Blackburn for one second?

THE COURT: Yes.

(Counsel conferring off the record.)

THE COURT: Sorry, Mr. Ramirez.

MR. BLACKBURN: I'd like to call Al Segovia, please.

THE COURT: Would you administer the oath, please.

(Witness sworn.)

THE COURT: Good morning. We're having a significant water consumption here, aren't we?

MR. BLACKBURN: It gets very dry up here, Your Honor.

THE COURT: I know. Are you cold? Is everybody all

right?

MR. BLACKBURN: Not like I was yesterday.

THE COURT: I haven't -- it's still coolish, but I'm not -- I don't know the situation. Did that blackout have to do with the heating?

THE CLERK: I'm not sure.

THE COURT: Maybe we ought to check that out and see if that's --

MR. BLACKBURN: Was that a blackout that just happened when the lights went off?

THE COURT: Yes. It wasn't a blink of your eye.

MR. BLACKBURN: I have moments of blackout up here, so --

THE COURT: I know. Please.

AL SEGOVIA, PLAINTIFF'S WITNESS NO. 9, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Would you state your name, please, sir?

A. Yes, sir. Al Segovia.

Q. And Mr. Segovia, at least at one time you were named as a Defendant in this case, were you not?

A. Yes, sir.

Q. And in what capacity were you sued in this case?

A. I was the South Texas -- I'm sorry.

Q. Let me just say. If the Judge is coughing, let's try to

wait in between.

THE COURT: You're the one talking, Mr. Blackburn.

MR. BLACKBURN: I know. I know.

THE WITNESS: My apologies.

THE COURT: Now start over.

BY MR. BLACKBURN:

Q. When this case was filed, were you named as a Defendant in this case?

A. Yes, sir.

Q. And in what capacity were you sued?

A. I was South Texas Water Master at the time, and the Concho River Water Master.

Q. And --

THE COURT: And you were what? Say that again.

THE WITNESS: I was also the Concho River Water Master.

MR. BLACKBURN: But you were the South --

THE COURT: South Texas what?

THE WITNESS: South Texas Water Master.

THE COURT: Water what?

THE WITNESS: Master.

THE COURT: Thank you. And also what?

THE WITNESS: The Concho River Water Master.

BY MR. BLACKBURN:

Q. And I guess we might as well say, what is the South Texas

Water Master?

A. Basically I was responsible for overseeing, monitoring, archiving most of the rivers in a 50-county area in South Central Texas, along with my staff.

Q. And where was the Water Master program for South Texas headquartered?

A. In San Antonio, Texas.

Q. And are you currently employed by the agency, by -- well, who does the South Texas Water Master work as a part of? What agency?

A. The TCEQ.

Q. And are you currently employed as the South Texas Water Master?

A. No, sir. I've retired.

Q. When did you retire?

A. The first time in May of, I believe it was 2010. Then I came back for a few months, and then I retired again in April of 2011.

Q. And were you South Texas Water Master during the time period of 2008-2009?

A. Yes, sir.

Q. Okay. Now, just a little bit of background. When did you start working for the Water Master program?

A. I believe it was in 1991.

Q. And you pretty much stayed in that position during your

entire career with TCEQ?
A. Yes, sir.
Q. And did your jurisdiction include the Guadalupe River and the San Antonio River systems?
A. Yes, sir.
Q. And basically, as a Water Master, were you responsible for the day-to-day management of the river systems under your jurisdiction?
A. The day-to-day operations as it concerned to the appropriated water rights.
Q. So when you say "appropriated water rights," what do you mean by that?
A. These are the water rights that were issued by the State to individuals to be able to use the water from the rivers, creeks, tributaries, for certain beneficial uses. And my staff and I oversaw those.
Q. And in times of water shortage, is the Water Master authorized to regulate the controlling works of reservoirs and other diversion works under your jurisdiction?
A. Yes, sir.
Q. Now, could you explain to Judge Jack sort of how this system works? I mean, in a year, let's say there's a lot of rain, a lot of water. Are you guys busy?
A. Yes, sir. Can't say we are, but we were. I guess the new Water Master is busy also. But I'm trying to decide where to

start. Do you want me just to kind of tell a daily routine --

Q. If you would --

A. -- of what happens?

Q. Yeah. I mean, I guess what I'm trying to understand is does the Water Master -- well, once we go from a time when there is a fairly good rainfall, fairly abundant water, not a lot of, if you will, disputes or shortages. As we begin to move into water short times, for example, if I want to appropriate water under my permit, do I have to let you know?

A. If you have an appropriated water right, yes, sir, you do, whether it's a drought or whether it's just when we have plenty of water, your obligation would have been to call our office before you start to take the water and let us know what your priority date is, how much water you were going to take, what your diversion rate is and what the use is for. And then we would either, depending on what the situation was with the water, we would either let you, give you permission to take it, or if we were enduring droughts, we could either curtail you or ask you to stop.

THE COURT: So, wait a minute. Are you saying that if I have a water permit that allows me 100,000 acre feet a year, when I start to use that, I need to tell you about it?

THE WITNESS: Your Honor, yes, ma'am.

THE COURT: Okay. And even if I've got a senior water right or junior water right, they're all treated the

same?

THE WITNESS: As far as calling in, yes, ma'am.

THE COURT: I would have to call you up and say, "Today I'm using 20,000 acre feet, and this is why"?

THE WITNESS: Yes, ma'am. It would -- and we would always ask, because of drought situations, we would ask people to always let us know before, so that we had a good idea as to how much water was being pulled out of the system at any one time.

THE COURT: In good times, where the water is abundant, do you require that as well?

THE WITNESS: Yes, ma'am.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And when Mr. Trungale was talking about that --

THE COURT: Are you part of the TCEQ, or what, what was that part of?

THE WITNESS: I was --

THE COURT: Okay. So this is --

THE WITNESS: -- as Water Master.

THE COURT: -- a subdivision of the TCEQ?

MR. BLACKBURN: Yes, Your Honor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. Now, when Mr. Trungale was talking about, he was basically

reviewing the files of the Water Master on water use, how do you compile those water use files?

A. Well, when people would call in to declare their water needs, we had a report called a DOI, or Declaration of Intent, that they would call us. Somebody in our office would take the message or talk to them directly and get the information that I just mentioned before, "How much do you want? What's your priority date?" And if things were at a time when we had plenty of water, they would just tell them, "Okay, go ahead and take what you're asking for," if it was within their limits. Excuse me.

And our staff would send out a report that was called a Pump Operation Report back to them. We would keep a copy. And they would have at that time the opportunity to amend it or just to okay, this -- we would send them the Return Pump Operation Report that would say, "Sorry, you had asked for five acre feet for two weeks. This is what we show." Sometimes it would rain. Sometimes their pumps would break. So sometimes they had to make amendments. They would usually call us and tell us, you know, "We can't pump for that long a period, so can you" —

THE COURT: It's getting cold, isn't it?

MR. BLACKBURN: Yes. Yes, Your Honor.

THE COURT: I'm trying to get an update on the --

MR. BLACKBURN: Excuse me, Mr. Segovia.

THE WITNESS: Sorry.
THE COURT: -- on the heat.
MR. BLACKBURN: No, I'm beginning --
THE COURT: Sorry.
MR. BLACKBURN: My knees are starting to shake. If I --
THE COURT: We could start little fires.
MR. BLACKBURN: Little fires, I'm sure there's been a thought or two of that.
BY MR. BLACKBURN:
Q. You were describing --
MR. BLACKBURN: You want to continue, Your Honor --
THE COURT: No, go ahead.
MR. BLACKBURN: -- or do you want to go take a walk?
THE COURT: No, let's go ahead. I mean, it's not going to get any better if there's no heat.
THE WITNESS: I think my knees are shaking worse up here, but --
MR. BLACKBURN: There's always a lot of different reasons our knees shake in this courtroom, so --
THE WITNESS: Mine's not the heat either. So --
THE COURT: I have not forgotten how it felt to be a lawyer in federal court, so --
THE WITNESS: It's been a while, ma'am, Your Honor.
THE COURT: It's been a while for me.

THE WITNESS: Do you want me to just continue?
BY MR. BLACKBURN:
Q. Would you, please?
A. Sure.
Q. I mean, basically we were talking about what's the process of getting water. If I have a permit, I send you a notice of intent to withdraw. Is that what it's called?
A. Yes, sir, a DOI.
Q. And --
A. And then we would take that information down. We would keep the piece of paper in our office. Then we would mail you back that same document that had a part for you to okay it, one that you would keep for your own records. And if you had to make any modifications to it or if you agreed with exactly what was called in, you would just sign it and send it back.

Once we got that back, we entered it into our database, with the understanding that sometimes those things were changed.
Q. But that is essentially the database of at least withdrawals that you were notified were going to occur?
A. Yes, sir.
Q. Now if, in fact, you were notified about a junior water right, somebody under a junior right wanted to withdraw water during a time when we're starting to move into low flow drought conditions, what do you do then?

A. Okay, I think the first scenario y'all had asked was if there was plenty of water.

Q. Sure.

A. As we get less and less rain and we progress into a drought, we would take certain accepts that were a little bit different. Depending on how severe the drought got, sometimes we, when there was plenty of water, you could just call it in and wait for a response from us, and we would usually let you go ahead and start. However, as the drought increased, you always had to talk to a live person to ensure that there was enough water for you.

If you were a junior water right holder -- and maybe I need to explain that a little bit.

Q. A little bit, yes.

A. Okay. "First in time, first in right" is the priority system that we use. So if you were issued a water right many, many, many years ago, you basically had first shot, and you had a higher priority of getting the water than somebody that was a relatively junior water right holder.

And I always tell people that all the water rights are relative to one another, because I get asked, "What's a junior water right, and what's a senior water right?" Well, the very oldest water right is the most senior. Everybody below them would be a junior water right. And the very last water right that was issued would be the most junior, and everybody to them

would be most senior. So it's kind of a everybody falls in between those. So I really could never say, "You have a junior," or "You have a senior," because it's all relative to the people around you.

So, but as we got into a drought, we would have more meetings to discuss the situations that were going on with the drought. And to see what people, because of their priority dates and the flows of the river, would we have to either cut back or start reducing the amount of water that they take. And this was a constant battle.

The Water Master program is no more than a balancing act. We have to know how much water is available. We had to know how many people wanted to take water, obviously what your priority date was and for how long that you needed the water. And this was a --

THE COURT: So you had the authority to say, "You can't take this water at this time"?

THE WITNESS: Yes, ma'am.

THE COURT: Okay.

THE WITNESS: We try to do that using common sense. As the water levels dropped, we were always kind of under the assumption that everybody was under the, we're under all the same drought. The junior water right holders obviously would be cut first, or restricted first before the senior water right holders. But as y'all know in this courtroom, Texas is

constantly in a drought, and usually these droughts have a tendency to last for a very long time. So we would continue to cut people and continue to cut people. And even the senior water right holders at some point might be restricted.

And what we would do sometimes on the river would be to stagger people. In other words, if y'all all had relatively the same senior priority date, and y'all all wanted water, we might ask somebody, "Okay, you pump from 1:00 in the morning to 5:00 in the morning." And we'd ask the next person, "You pump from 3:00 in the morning to 8:00 in the morning." But we would stagger the times so that we didn't put such a stress on the river at any one given time. We didn't want everybody's straws in the river at the same time to drop the river levels.

One of the other things I've mentioned is one of the prime objectives that we had was to try to keep the river wet. And what that means is, even as people were taking it out, the last thing we wanted to do was drop the river so much that it would be very, very difficult to recharge it.

And so, and one of the things that made it difficult for us is that the senior water rights were all lined up very nice, like the oldest ones way up above certain areas, and it went down. They're scattered all over. So we had to be able to try to make sure that we took care of the seniors that were downstream, in the middle of segments, and upstream.

And along that, we also had to take care of what

y'all have been calling D&L water rights, the riparian rights. But if I could, I'd just like to make a distinction.

Q. Sure.

A. There's, y'all have been calling them D&L, domestic and livestock rights. But there's also D&L water rights that have been issued into permits. There are not very many of them, but --

THE COURT: That was the 1967 that you were talking about?

MR. BLACKBURN: Um --

THE WITNESS: I think those were adjudication water rights.

MR. BLACKBURN: That was the adjudication time period, when -- that was when essentially the domestic and livestock exemption concept was created in '67.

THE COURT: Was codified.

MR. BLACKBURN: I'm sorry?

THE COURT: Okay.

MR. BLACKBURN: But what Mr. Segovia is talking about, is there's actually in a permit something called a domestic and livestock. It's a rare thing, I'd say somewhat rare.

THE WITNESS: Yeah.

BY MR. BLACKBURN:

Q. But nonetheless, sometimes permits have D&L specifically

called that. Was that your testimony?

A. Yes, sir. There's not very many of those, but just so that you're aware, they are in there. So they would call in just like somebody that was going to use an irrigation water right. But usually in our office, what we call a riparian right was your, the old common law. You were given a right that if you owned property next to a river --

THE COURT: You got the water.

THE WITNESS: -- you got the water. But I heard something that might have been a, to me a little bit misleading. The 200 acre feet that the other gentleman mentioned, that applies to reservoirs.

Most, most -- when you have a riparian right, which means you can just put a hose or, into the river to take water for your own personal needs, and that went from watering your livestock, exotic animals, your rabbits, your dog, if you want to grow a garden, if you even had an orchard, but you had to consume everything in that orchard for yourself and for your family. Once you obtained some type of gain, you sold it, then you lost your exemption.

So all these riparian rights have an exemption that didn't require the State to issue them a permit. I don't, I don't know if there's, I don't believe that there's a limit as to what they could take for those D&L uses, but for the reservoirs, it was limited to 200 acre feet.

MR. BLACKBURN: And --

THE COURT: So what, tell me about, what does that mean, "the reservoirs"?

THE WITNESS: If you had a --

THE COURT: If I had a water tank on my property, is that what you mean?

THE WITNESS: Yes, ma'am. If you had --

THE COURT: And I also had riparian rights?

THE WITNESS: If you're on a creek or a river or lake and you own the property adjacent to or into the middle of the creek and you wanted to take water for your own needs, say you wanted to have a little fish pond, aesthetic purposes, you were allowed to take that to use it for that.

THE COURT: Okay.

THE WITNESS: But you don't have to report that to the state, because used to be that was part of your God-given right that you're allowed to do that, and you have an exemption to be able to do that. However, if you start, you could water your animals to drink, but the second that you started watering grass or oats or something for them to eat, then all of a sudden that exemption, you would have to get a irrigation permit. So it's kind of a fine line. You can let your animals drink, but you can't feed them, because that becomes an irrigation permit.

THE COURT: And you can't irrigate the land --

THE WITNESS: Yes. And --

THE COURT: -- without a permit.

THE WITNESS: Yes, ma'am. And you can't take that exempt water right that you have and you can't be watering orchards to make money or growing corn or any of those kind of things, because then you're going to derive a profit for it, unless you're going to consume all of it.

BY MR. BLACKBURN:

Q. Now, if I'm a -- and I assure you I'm not -- if I were a rich Houston lawyer, and if I were to go out somewhere along the Guadalupe River and buy several hundred acres with permits along the river --

A. Yes, sir.

Q. -- could I just put a straw in the river and pump and not have to tell you?

A. It depends on your use.

Q. I'm going to -- well, I'm, you know, I'm a retired, I mean, I'm a wealthy lawyer, I'm just going to raise some real cute animals that don't belong in this part of the world, and you know, I'm just going to shoot them, but for my own consumption.

A. If you're taking that water to water your lawn or to water the animals, you do not have to report that to us.

THE COURT: Or if we were growing apples that we ate all ourselves.

THE WITNESS: Yes, ma'am.
BY MR. BLACKBURN:
Q. Or peaches, or whatever. As long as --
A. Whatever, yes.
Q. -- it's for yourself.
A. Yes.
Q. Or if I just --
THE COURT: But if you open up a roadside stand, you're in trouble.
THE WITNESS: Yes. Well, we have to determine that that's coming from your orchard.
THE COURT: Do you have like irrigation police out there, or how do you --
THE WITNESS: Well, that was the other thing I was going to get to. Yes, ma'am --
THE COURT: By the way, you're going to warm up. It's still not fixed, but they can warm us 2 degrees.
THE WITNESS: Well, I'm not shaking as much, so I guess it's getting better.
MR. BLACKBURN: It's like parts per thousand. Every one counts.
THE WITNESS: We actually have what we call Water Master specialists, sometimes they're called Water Master deputies, that are based in different parts of South Central Texas, and in the context we're just discussing South Texas,

I'll just --

BY MR. BLACKBURN:

Q. No, no, go right ahead.

A. -- keep it at that. They have offices basically like game wardens. Their offices are in their homes. And we try to locate them geographically throughout the South Central Texas area. And each one had about ten counties that they're responsible for. But their job daily, after they reported into the office to tell me that they were there or if they were sick or whatever, their jobs were to actually drive up and down the rivers and creeks. That's their full-time job. So they're basically a water police for the State that went around to make sure that people were taking water that were supposed to be taking it at the times they were supposed to be taking it or make sure other people that weren't supposed to be taking it, didn't take it. And they would, I guess each one would drive about 100,000 miles a year. So they're constantly out in the field.

Q. Now --

A. And they would come into the San Antonio office to report, or if there was incidents where they thought I needed to be made aware of, they would do that. They used the USGS gauges, United States Geological Survey gauges, of which there are hundreds scattered throughout South, Central Texas. Most of them are on the main rivers. But those kind of were really

used for our guidelines, because some of the permits that were issued have restrictions written into them. So if the restriction said that once the water flow in a certain part of a segment of the river, you know, I'll just pick a number, dropped below 120 CFS, cubic feet per second, that permit would not be allowed to take any water.

And we actually would go out, the staff would go out on some of these permits to help the water right holders, and we would actually go out and set markers in the water, and we would take measurements that would say, "Okay, here is your 120 mark," and we would mark a bridge or something on a tree that would say once the water dropped below that amount, you would not be allowed to take any more water. So that the water right holders had some kind of reference as to when they could and couldn't take water. Some of the older ones don't have any restrictions put into them, but all of the newer ones do.

Q. But so these most senior of the rights are unlikely to have those restrictions?

A. The very most senior ones, yes, sir.

Q. Now --

THE COURT: Don't have what restrictions again?

THE WITNESS: Restrictions that they, they didn't have any flow restrictions placed on them as to -- because they're so much older, before they were written in, they would just have an open amount. They would just say, "You are

allowed to take 50 acre feet." And the newer ones would say, "You are allowed to take 50 acre feet, as long as the flow is at such-and-such."

THE COURT: All right. But even the most senior ones have to call you?

THE WITNESS: Yes, ma'am.

THE COURT: And you still have to approve?

THE WITNESS: Yes, ma'am.

THE COURT: Okay. So in that way, it kind of works?

THE WITNESS: Yes, ma'am.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. But if a senior one calls you in -- calls in, you have to approve it and knock juniors off if they are in fact senior. Is that right?

A. Well again, it depends. I may approve both of them, depending on the water flow. The senior would be able to take water for a longer period of time, more often than a junior. But at some point, when the drought would reach a certain point, even the seniors would start to be cut back.

Q. And, but you would cut the seniors back to keep flow in the river?

A. Yes, sir.

Q. Now, when it comes to the bay, did you, as Water Master on the Guadalupe -- you had authority over the Guadalupe and the

San Antonio River systems. Is that right?
A. Yes, sir.
Q. Did you, as the Water Master, ever impose or limit flows -- or I'm sorry -- did you ever impose or limit conditions on withdrawals to, on the basis of trying to get water to the bay system?
A. I had to ensure that enough water was getting down to any riparian water right holders. I guess I should have mentioned that earlier, because they had first shot at the water. So regardless of the seniority of your priority water right, I always had to try to ensure that senior, or I'm sorry, riparian rights would have access to the water.
Q. So in the --
THE COURT: I'm not understanding.
MR. BLACKBURN: If there was a domestic --
THE COURT: Are you saying: Do you ever impose limits on permits to protect the estuaries?
MR. BLACKBURN: That was my question. And what he --
MR. WILLIS: Your Honor, I'd like to -- I'm sorry to interrupt, but we're using the term whether he is imposing these restrictions, as opposed to enforcing them.
THE COURT: I understand.
MR. WILLIS: Okay.
THE COURT: The TCEQ.
MR. WILLIS: Right, through the permitting process.

We're getting a little bit of confusion --

THE COURT: I understand that.

MR. WILLIS: -- between the permitting --

THE COURT: Okay.

MR. WILLIS: -- process itself and the implementation of that.

THE COURT: I'm back on track.

MR. WILLIS: Okay.

THE COURT: Thank you.

MR. BLACKBURN: And let me apologize, I'm not trying to make suggestions about authority, per se. I was just trying to use the fact that -- or question on the fact that --

THE COURT: Okay. Well, let's just say, do you ever, do you ever see permits that impose limits to protect the estuary fresh water flow?

THE WITNESS: I --

THE COURT: Is that not right?

MR. WILLIS: Well, Your Honor, it's --

THE COURT: You don't like my question?

MR. WILLIS: If the question is asked instead is: Do you see restrictions on permits, including stream flow restrictions --

THE COURT: Well, he already says yes.

MR. WILLIS: -- that has the effect of protecting bays and estuaries, well certainly that's a different question,

as opposed to -- but anyway. I'm sorry, Your Honor.

THE COURT: It's my question. You can't object.

MR. BLACKBURN: I think that's exactly what he's doing, Your Honor.

THE COURT: I appreciate that. And you certainly can object.

So do you ever see permits that actually limit water usage based on protecting the estuaries downstream?

THE WITNESS: I, at this time I don't believe so, ma'am.

THE COURT: Okay. And I understand what you're saying, is that the end result would be to protect the estuaries, to limit the flow. I understand that. But I guess what he was trying to say is it written there some place, and it's not. Okay?

MR. WILLIS: We'll address it with several other witnesses as well, Your Honor.

THE COURT: And I appreciate that.

MR. WILLIS: Okay.

THE COURT: And I, somebody's going to tell me that you do look at the position of the estuaries when you limit the flow.

MR. WILLIS: That's correct, Your Honor.

THE COURT: I figured that.

MR. BLACKBURN: Now, with regard --

THE COURT: Is it time to take our morning break?

MR. BLACKBURN: I think that would be a great idea, Your Honor. Thank you.

THE COURT: It's just getting colder and colder in here. Maybe we ought to ask another 200 people in.

(Recess from 9:59 a.m. to 10:19 a.m.)

THE COURT: Thank you, Mr. Segovia. You may sit back down. Go ahead.

BY MR. BLACKBURN:

Q. Mr. Segovia, when you were at the agency, now I think you were saying that like one of these, for lack of a better word, one of your water sheriff's would have ten counties to cover. Is that right?

A. Roughly, yes, sir.

Q. And was it -- do you have access to like computer modeling of how all of these different permits work together and things like that as part of what you do?

A. Not, not the computer modeling.

Q. And in terms of the rivers themselves, do you have access to boats to actually go down the river, and do you routinely go down the river and just check to see where pipes and where kind of, if you will, straws in the river are?

A. We would occasionally go down the rivers. We didn't do it that often in boats, but we were able to get access to the properties. And a lot of the neighbors would also inform us if

they thought they heard pumps going on. So that was one of the factors that we used to go check.

Q. So like if you wanted, if I were the -- where are your -- where's the regional offices, or I guess where are the offices within the South Texas Water Master system that would have jurisdiction over the Guadalupe and San Antonio River systems?

A. Well, they all at one time may cross over to help out, depending on what the situation was, but the main offices there would have been the San Antonio office, the office that we have near Stockdale and Beeville, and then the one in the Hill Country.

Q. And if I were in Stockdale or Beeville and I wanted to take a boat out on the river, where would I have to go to get that boat?

A. Probably San Antonio.

Q. So I'd have to drive to San Antonio, get a boat, bring it back, and then put it in the water?

A. Yes, sir. And what they would do is ask us a couple of days in advance if they were going to come get it, or if they needed it. And they also, we would borrow some boats like long boats or jon boats from the District Office.

Q. And how about aerial flights? Do you have access to aircraft or helicopters to make aerial surveillance?

A. No, sir.

Q. So would it be fair to say basically that you work on a

self-reporting system?
A. Could you repeat that a different way, please?
Q. Well, first of all, if I'm intending to take water out of the river, I call and I ask permission, and then you give me permission. Right? Do you come in and verify that the amount of water taken is exactly what it's supposed to be?
A. If you're a permitted holder, yes, sir.
Q. How do you do that?
A. The deputy will go out and check the meter readings that are on the diversion points, and those are nonresettable totalizers that are on those meters.
Q. Do you feel pretty good about the water that's under permit, that you have a fair idea of what's happening?
A. Pretty good idea, sir.
Q. Right.
A. Yes, sir.
Q. Now, what about water sales contracts, where someone has water, and then they're diverting it and then selling it? Is that okay?
A. Their selling contract? If they let us know, yes, sir.
Q. And how about the monitoring on those sales contracts?
A. We would usually require them to put some kind of metering on those.
THE COURT: Put some metering?
THE WITNESS: Yes, ma'am.

THE COURT: How does that work?

THE WITNESS: They put a meter on the pipe that they're pulling the water from, and it has a little impeller on it that measures the amount of water that's going through it. There's different types, but that's the type we mostly use.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. And now with regard to the riparian domestic and livestock, sort of the classic, the group that does not require a permit. Now we were talking about this lake, this 200 acre feet. That's the size of the lake, is it not?

A. The capacity of the lake.

Q. The capacity. So if I had a lake 20 acres big and 10 feet deep, 200 acre feet?

A. Yes, sir.

Q. So I draw it down. Can I fill it back up?

A. Yes, sir.

Q. And I draw it down again. Can I fill it back up?

A. Yes, sir. I think it had to average 200 acre feet over a year's time. I'm not exactly sure about three. I think that's the numbers.

Q. And then is that monitored?

A. No, sir.

Q. And with --

A. Well, we would go by and look at it to make sure that the

lake was staying at the same capacity, that it hadn't been expanded or anything.

Q. So you look at it from the standpoint of sort of visually how big is it?

A. Yes, sir. We also take measurements on them.

Q. And, but if it, if the water level goes down, I can fill it back up. Right?

A. Yes, sir.

Q. And --

A. If it's for the riparian right.

Q. Right. If it's for a riparian user, and my lake, my 200 acre foot pond goes down, I can pump it and fill it back up. Correct?

A. Yes, sir.

Q. And I can --

THE COURT: So you could use thousands of acres.

THE WITNESS: Pardon me?

THE COURT: You could use thousands of acre feet.

THE WITNESS: No, only up to the 200 acre feet.

THE COURT: Well, I know, but you keep draining it out and adding it back in, and draining it out and adding it back in.

THE WITNESS: Well, not all --

THE COURT: The container is limited to 200 acre feet.

THE WITNESS: Yes, ma'am.

THE COURT: But what he's, I think what he's asking you is that you can't tell how many times a week somebody fills that up.

THE WITNESS: Not for a riparian right.

THE COURT: Okay.

THE WITNESS: At times of drought, we would also ask these folks if, to be considerate of their neighbors and try to keep that as low as possible, if they could.

BY MR. BLACKBURN:

Q. Right. So you ask them to be good neighbors, and you know, but have you ever dealt with rich Houston lawyers that are neighbors?

A. I don't know if they were from Houston or how rich they were, but we've had neighbors that had vanity lakes.

Q. What are vanity lakes?

A. Vanity lakes are what we, a term that we use for people that wanted a lake that was just for aesthetic purposes.

Q. And can I have a vanity lake on my 200 acre feet?

A. If it's exempt, yes, sir.

Q. And can I water ski on it?

A. Yes, sir. Well, I mean, I don't know if you can or not, but --

THE COURT: I don't think I'd try that.

MR. BLACKBURN: Well, 100 acres one foot deep, two

feet deep. It would get a little tight, but --

THE COURT: It's a bad fall.

MR. BLACKBURN: Bad fall.

BY MR. BLACKBURN:

Q. Now, in terms of the, forget about the lake. I don't have a lake, but I want to raise a bunch of oats for deer. I just like to have a lot of deer around, like to look at them. Can I water my oats with the water from the, from the river?

A. No, sir.

Q. Not going to sell the oats, not going to sell the, not going to sell the hunt?

A. No, sir.

THE COURT: Because you're not consuming it yourself.

THE WITNESS: No, it's -- that's considered irrigation.

MR. BLACKBURN: That would be irrigation.

THE COURT: Okay.

THE WITNESS: Yes, sir.

BY MR. BLACKBURN:

Q. So I've got to be somewhat trickier than that.

THE COURT: Well, but you could irrigate if you eat all the product yourself.

THE WITNESS: Yes, ma'am.

THE COURT: So if you're giving the oats to the deer, that's not the same thing.

THE WITNESS: No, ma'am.

THE COURT: But what if you're giving them to your cow? Cows?

THE WITNESS: You could still, the oats, that's still irrigation. Any kind of animal or livestock, you can water them. They can drink. But you can't grow anything for them to eat without it being considered irrigation.

THE COURT: Okay. That's tricky. Thank you.

BY MR. BLACKBURN:

Q. But I can grow pecans?

A. Yes, sir.

Q. For myself.

A. For yourself, yes, sir.

Q. I can grow fruit trees for myself.

A. Yes, sir.

Q. And I -- let's say I happen to be, I happen to like St. Augustine grass, and I've just got a nice big pretty yard. Can I water it with the river?

A. Yes, sir.

Q. Unlimited?

A. As far as I know, yes, sir.

(PAUSE.)

MR. BLACKBURN: Just a minute, Your Honor.

BY MR. BLACKBURN:

Q. Now, have you ever, in your experience, when you were with

Water Master, ever made any type of accommodation or arrangement to provide flow for endangered species through the Water Master program?

A. Specifically, no, sir.

Q. And have you ever had anyone discuss with you while you were Water Master the fact that the whooping crane may need water and we had to figure out how to get some to it?

A. No, sir.

Q. Well, Mr. Segovia, I appreciate your indulgence. I hope you enjoy your retirement.

A. Thank you.

MR. BLACKBURN: And I pass the witness, Your Honor.

THE COURT: With that kind of life, I'm sure you're grateful to have retirement.

THE WITNESS: Yes, ma'am. A lot easier, Your Honor.

MR. WILLIS: May I redirect a little, Your Honor?

THE COURT: Please.

CROSS-EXAMINATION

BY MR. WILLIS:

Q. Mr. Segovia, it seems to me that we've asked the Court to jump into the middle of the story, without giving her some guidance on some of the first part of the story. I'd like for you to talk about the Water Master program itself just a little bit.

First of all, you understand that it was a legislatively

approved position that was to be enacted under the auspices of the TCEQ. Correct?

A. Yes, sir.

Q. And eventually, the TCEQ created Water Master on South Texas, the South Texas Water Master, for example. Correct?

A. Yes, sir.

Q. And then later created the Concho Water Master program?

A. Yes, sir.

Q. Now, in the South Texas Water Master program, just so the Judge understands, do you have an estimate -- and I'll let you explain the difference. It's important at some point, and the other witnesses will explain this as well, but the difference between permitees or water permit use holders, as opposed to certificates of adjudication. But considering both, because at certain times there are both water diverters on the river, correct?

A. Yes, sir.

Q. Give me an estimate, and I'm not going to hold you to the exact number, of how many water right holders, and that's both certificates of adjudication and permits, on the San Antonio and Guadalupe River.

A. Oh, I can't tell you exactly on the San Antonio and Guadalupe River, but I can tell you in the area that we have, it's about somewhere between 15 and 1600.

Q. That's pretty much all of the South Texas area?

A. Yes, sir.
Q. Okay. And that's a very good distinction. I appreciate that, because it's not just on those rivers, but on the tributaries to those rivers as well?
A. Yes, sir.
Q. Okay. And I'm going to jump around a little bit, because it's -- I think it would be easy to get the wrong assumption that you, as a Water Master, in determining the use of the water, by diverters, is somewhat of guesswork. And I'd like to go through -- first of all, yesterday one of the witnesses, I believe it was yesterday, talked about the gauges on the river. Now again, explain to the Judge what is meant by the gauges on the river.
A. Well, the gauges are United States Geological Survey gauges that are placed on the rivers. And sometimes if you drive on the highway, you can see these little mirrored things sticking up off of bridges and stuff, and those are usually gauges. And what those gauges do is they determine the amount of, where we use them determines the amount of water flow that's passing at any given point.

So when we have flood events, those gauges can be way off the charts. And when the water starts dropping, it will reflect that the water flows are less. And those gauges are very important to us, because they give us a broader sense of what's going on throughout the area. It gives us a much bigger

viewpoint of what's happening.

And before -- we use those gauges to make a lot of the determinations on the restrictions that are written into the permits. But what happens also is if we have critical cutoffs, if the water drops below a certain amount and it's tied to a gauge, what we would always do is ask the USGS folks to go out to verify them and recalibrate them before we made a decision to say, "Okay, we're going to cut you off because the flow has dropped below that." So we work in conjunction with them.

Q. Mr. Segovia, yesterday I think one of the witnesses indicated that he thought there were two gauges on the rivers in the South Texas Water Master area. Tell the Judge, if you would, what's your best estimate of the number of gauges?

A. Several hundred.

MR. BLACKBURN: And I'm sorry, I think that's a slight mischaracterization. It's two gauges in the lower area that were leading to the flows coming into the bay.

MR. WILLIS: If I misrepresented, I apologize. I thought --

THE COURT: That's what I understood, too.

MR. WILLIS: Okay. You understood it was two?

THE COURT: Well, no, at the mouth of each of those two rivers that came into the bay.

MR. WILLIS: Okay.

THE COURT: I didn't -- I didn't understand it to be

an exclusive list of the gauges.

MR. WILLIS: Okay. Fair enough. Sorry about that.

BY MR. WILLIS:

Q. Besides your position as the Water Master, you explained a little on direct on the deputies or essentially the Deputy Water Masters. And it seemed as though Mr. Blackburn was indicating in the questions about whether or not, or how often you would go get in a boat and go down the river, not just you but the deputies.

Let's talk about your deputies and how often they're out there physically on the rivers. And when I mean physically on the rivers, I don't mean necessarily in a boat, but monitoring those rivers by sight and going down, up and down the rivers and talking to diverters and riparian right holders. Would that be on a daily basis?

A. Yes, sir.

Q. Okay.

THE COURT: He said it was full time, 100,000 miles a year each of them. So how many miles would that be? That's a lot.

MR. WILLIS: Yes.

BY MR. WILLIS:

Q. As a matter of fact, did you tell the Judge earlier how many Deputy Water Masters that you had?

THE COURT: No.

THE WITNESS: Well, with both programs, it was nine staff. In South Texas, it was seven. And usually either one or two would be administrative folks. So we basically in South Texas had five deputies to cover that.

And I'm sorry, I think I might have misquoted, now that you mention it. It's probably about 25,000 miles that each one covers, and it's over 100,000 miles total. I'm sorry.

THE COURT: Oh, okay.

THE WITNESS: I apologize.

THE COURT: I had thought each one of them had --

THE WITNESS: Yeah, I just, when you mentioned it, yes, ma'am.

BY MR. WILLIS:

Q. And you spoke briefly on direct, although I think the question was about whether or not this was considered a self-reporting system, if any of the diverters are diverting improperly, and you spoke about the diversion meters. We'll get to those in a second. But I think certainly in your deposition you explained a little bit to Mr. Blackburn about, not only did you have these deputies out on the river, on a daily basis, but you also even spoke to a lot of the County Commissioners, I'm sorry, County Judges and put them, asked them to be vigilant with their law enforcement personnel on watching for illegal diversions. Correct?

A. Yes, sir.

Q. Again, I apologize for jumping around. Go back to the D&L users for just a moment. It seemed the last few questions regarding these 200 acre feet impoundments for the D&L users, you've explained to the Court that there are restrictions on the use of the water when the D&L users bring the water out of the river. And there's no need for me to go back through. You explained that.

You also explained that if they were impounding water, that there was a restriction on how much water they could impound, the 200 acre feet. Correct?

A. Yes, sir.

Q. But if they use that water -- because the question was essentially can they impound 200 acre feet and drain it, and impound 200 acre feet and drain it. They have the right to refill it, but the use of that water that they have impounded is still the same restrictions on the use for D&L users. In other words, they can't, just because they --

THE COURT: I understood that.

MR. WILLIS: Okay.

THE COURT: I understood that.

MR. WILLIS: I wanted to make sure --

THE COURT: That's true, isn't it?

THE WITNESS: Yes, sir -- I mean yes, ma'am. I'm sorry.

THE COURT: I understood that to be the case.

MR. WILLIS: My apologies.

THE COURT: When you're talking about a water tank, you know, on a 200 acre feet or a pond or a lake, there's a lot of evaporation in it, you know. You can just keep filling it up so your fish don't die or if you're, if it's a, what did you call it, a vanity lake.

THE WITNESS: Vanity lakes.

THE COURT: And --

MR. WILLIS: And --

THE COURT: That was what I was understanding.

MR. WILLIS: I understand.

BY MR. WILLIS:

Q. And the point I'm getting to is, I want to make sure that the Court understands that you indicated there's no written inventory kept of D&L users. Correct?

A. Correct.

Q. But do you, through your experience as a South Texas Water Master, with the assistance of all your deputies, do you have, would you consider that you have a very good understanding of the D&L use, and generally what the, who they are, where they are, and roughly their approximate usage throughout the time that you're on the river?

A. Yes, sir.

Q. Okay.

A. I couldn't give you a definitive number, but the deputies,

because they're out there in the field, and they're their neighbors, they pretty much know what's going on.

THE COURT: Do they concentrate on the D&L? I don't know how it works. That's why I would like to know. If it were me, I wouldn't be concentrating on the D&L, unless looking for fruit stands and that sort of thing, but I'd be concentrating on the permitted holders.

MR. WILLIS: That's exactly the point.

THE COURT: So that's what --

MR. WILLIS: I've been waiting for four days to use the red herring term, Your Honor, but I wanted to make sure that we weren't letting the Court think that, that at least from the State's opinion -- and we'll have plenty of witnesses that address this later as well, that the D&L use is miniscule compared to what we're talking about on the use of water in the river.

THE COURT: I just wouldn't think there would be a lot of time spent trying to monitor the D&L users, more the permit users.

MR. WILLIS: Well, that's a good point. You know, it's -- first of all --

THE COURT: Which do you think?

BY MR. WILLIS:

Q. Is there a, I guess what we're asking is the monitoring of the river itself on both not just D&L but all permittee

holders?
A. Yes, sir. Well, the majority of the job is to go and monitor the appropriate water right holders. And while we're doing that, we're constantly passing the other properties. And sometimes we have to drive through properties, many properties that are along the river to get down to whoever the permitted water right holder is. And that's one of the methods that we have of kind of keeping track, and the neighbors are very good about, if they hear pumps, they let us know that, you know, "At night I heard a pump. Can you go out and check on this for us?"
Q. And the, the, getting off D&Ls for a minute, but let's get back to the permitees or the certificate of adjudication holders. When they're diverting water, it's not -- first of all, you've already explained to the Court how they are required to notify you when they intend to take water.
And let's talk about that for a moment. I think the Judge gave an example that if she had a permit that allowed her to have 100,000 acre feet of water a year, and she indicated, she called and said, "I want to take out 20,000 acre feet" -- I think you've said before that it's, you look at it like that account is like a bank account. And essentially, it starts with 100,000 in that bank account that year, and then you will subtract out the diversions that they make throughout the year.
A. Yes, sir.

Q. Is that fairly accurate?
A. Yes, sir.
MR. WILLIS: And I'm going to give -- I hate to do this, but could I ask for the ELMO, Your Honor?
THE COURT: Sure.
MR. WILLIS: And this is what I had mentioned the other day. I'm going to ask him to make some notes on a very poorly drawn drawing, and then ask him to prove it up, and then enter it into evidence at that point, if that's okay.
THE COURT: Yes, sir.
MR. WILLIS: And that's where I'm starting with is a very basic drawing.
MR. BLACKBURN: That is basic.
MR. WILLIS: I must give my co-counsel Marshall Coover some credit for this very basic --
THE COURT: Oh, don't, don't do that.
MR. WILLIS: Let's see if we can zoom out a little bit.
THE COURT: Mr. Coover, I had no idea. Your parents will be pleased.
MR. COOVER: The highlight of my legal career.
THE COURT: Thank you.
MR. WILLIS: Yes, that's my handwriting. That's why it's so poor.
First of all -- and Your Honor, if I get into this

and it's something that you think that I probably, is already, we're way past that, that's fine. I'll get off of it. I just wanted to make sure we're all on the same page.

BY MR. WILLIS:

Q. All right. Mr. Segovia, I'm going to make a few notes, and just to make sure we're on the same page, all this area in here is Texas. And then this is the gulf, and this is a river running down to the Gulf. Are you okay with that?

A. Yes, sir.

Q. All right. Now --

THE COURT: Okay. For purposes of the record, all the land to the left of the big line, going from right to left, is Texas. All of the right is the Gulf. Right?

MR. WILLIS: That's correct.

THE WITNESS: I think that's --

BY MR. WILLIS:

Q. All right. I'm going to draw an arrow, several arrows on the river.

THE COURT: Which river is this?

MR. WILLIS: It's a innocuous river. We'll name it, if you'd like. I'm just --

THE COURT: No, no, it doesn't have a name.

MR. WILLIS: It does not have a name.

THE COURT: Okay.

BY MR. WILLIS:

Q. Do you see the arrows I've drawn? And I've numbered the one in the middle Number 1, the one towards the top Number 2, and the one towards the, closest to the Gulf Number 3. Do you see that?

A. Yes, sir.

Q. Okay. One of the things that is your job as a Water Master, let's assume that all three numbers, 1, 2 and 3, were diverters that had requested to take water, and that all three of them had essentially permits that were certificates of adjudication, I should say. And each of those certificates --

THE COURT: Can you tell me the difference?

MR. WILLIS: Basically, Your Honor, throughout the late, starting in the late 1800s, in through the 1900s, there were attempts to allow water right holders to perfect -- not to perfect, but to register those rights. And at points they were registered with the County or District Clerk. The water Adjudication Act of 1967, essentially what it was is it was an attempt to get all these, what they felt were probably prior adjudicated rights, to converge, to combine that and merge that with the system, the common law system of riparian right holders.

And so what they did, and I'm sure I'm going to slightly misquote this, and I'm sure Mr. Blackburn will correct me, but they, the system allowed right holders that were prior right holders, people that they felt like they had, for many

years previous, had already proven their right to take water out of the river to a certain level, and for a certain number of years they had done this --

THE COURT: Okay. So you're saying that these are people that were not riparian rights.

MR. WILLIS: That's correct.

THE COURT: Lived a few miles off, and diverted the water from the river to whatever their use was.

MR. WILLIS: That's correct.

THE COURT: And they got these certificates of adjudication through their local government or some type of adjudication.

MR. WILLIS: The process was essentially you went through the predecessor to the TCEQ of many years ago that was, which first would issue the certificate based on what they proved. They had to show proof of use, they had to show how long they had used it, they had to show a volume of water. And all of that would have gone to the court for adjudication. And most of them were accepted by the court de novo. I think there were some that were challenged.

And then once the court issued the certificate and basically a court order on it, it went back and the TCEQ's predecessor issued the certificate of adjudication based on what the court order was.

THE COURT: Now, does that go with the land?

MR. WILLIS: It's not part of the land. No, it's a property right itself, but it's not part of the land.

THE COURT: I meant does it go, when that person sells that's, you know, ten miles away from a river --

MR. WILLIS: It has nothing to do with the land. That's the riparian. The water right for the riparian holders does go with the land.

THE COURT: Right.

MR. WILLIS: But for example -- the reason that this was used even back in the late 1800s and 1900s was during the expansion era on the plains, of course, they would have irrigation companies. They would have water companies. So it wasn't necessarily -- it wasn't tied to land at all. It was the right to take the water and use it for irrigation purposes.

THE COURT: An individual person? So it went --

MR. WILLIS: Or a company.

THE COURT: A company, like a cattle company or --

MR. WILLIS: Yes.

THE COURT: -- a fruit company?

MR. WILLIS: Yes.

THE COURT: And so when -- that became a property of the company that they could sell.

MR. WILLIS: They can sell those property rights. Absolutely.

THE COURT: Okay. So --

MR. WILLIS: And although it's considered a property right --

THE COURT: So it's not tied to any land?

MR. WILLIS: -- it's not tied to the property, it's tied to the right.

THE COURT: And it's not a riparian right.

MR. WILLIS: That's correct.

THE COURT: So in '67, at some point did they stop doing those certificates of adjudication?

MR. WILLIS: That's what -- the Adjudication Act of '67 gave everyone the opportunity to come in and prove up your rights, if you were, if you felt like you were a prior right holder, separate and apart from the D&L users, or the riparian --

THE COURT: Or the riparian rights.

MR. WILLIS: Right. So they gave everyone a period of time to come in and prove that up.

THE COURT: And then it was over.

MR. WILLIS: And if they were not adjudicated during that time frame, any rights that they may or may not have had were extinguished.

THE COURT: Okay.

MR. WILLIS: So in those priority dates -- we'll talk about permits after this. But the priority dates that were assigned on these certificates of adjudication were, and this,

essentially were based on when they could prove or how long they could prove that they had established that right. Some of them go, I think we have some in the early 1700s. But a lot of, many in the 1800s, and many, most I would say in the early to mid 1900s.

THE COURT: So then they all were converted into permits?

MR. WILLIS: No. They are still called certificates of adjudication.

THE COURT: Okay.

MR. WILLIS: And for all practical purposes, they have the same -- well, not all practical purposes, but for many, they have the same, it's essentially the same as a permit, because they're entitled to water under their certificate of adjudication. But the permit system that was also part of the Adjudication Act, from a certain date forward after that act, they had to apply for a permit, through TCEQ or its predecessor. And those permits, again, it's all -- they're assigned a priority right as well, but those permits are assigned essentially when I think the application process is complete. I'm a little wrong on that, and we have witnesses that can address these specific issues, but the permits, the permit program was put into place after everything was adjudicated under the Adjudication Act of '67.

THE COURT: Okay.

MR. WILLIS: Okay?
THE COURT: So no new certificates of adjudication?
MR. WILLIS: No.
THE COURT: After that time period.
MR. WILLIS: That's correct. And it took --
THE COURT: Are they also --
MR. WILLIS: It took a few years for this, for all this to play out through the courts --
THE COURT: I understand.
MR. WILLIS: -- as you might imagine.
THE COURT: Are they treated the same as the permit holders?
MR. WILLIS: Yes, on seniority issues. And that's, he addressed that earlier.
THE COURT: On seniority issues. But if, I assume that a certificate of adjudication says you're entitled to 100,000 acres, water acres a year for the following purpose, do they also have to call you and say --
MR. WILLIS: Absolutely.
THE WITNESS: Yes, ma'am.
THE COURT: Okay.
MR. WILLIS: Absolutely.
THE COURT: Thank you.
MR. WILLIS: And although, again, other witnesses will address this, but if they went in and tried to amend

later, let's say they had a 1930 priority date on a certificate of adjudication, but wanted to come in and add a lot of volume to their certificate, that's considered, that would be a completely, if it was granted.

THE COURT: A new permit.

MR. WILLIS: A new --

THE COURT: Okay.

MR. WILLIS: Or even if it's an amendment to that permit, it's given a new priority date. So that they go much more junior for any of the additional water.

THE COURT: I got it.

MR. WILLIS: Okay. Let's see if I can remember --

THE COURT: Sorry.

MR. WILLIS: That's okay.

BY MR. WILLIS:

Q. I was talking about the wonderful drawing here, and although this is a very simplistic drawing of only three water rights holders, make sure that the Court is understanding what we're saying, is that Number 1 had the oldest of the priority dates. Let's say it had a 1910 priority date on its certificate of adjudication. Number 2 in the upper left-hand corner had a 1950 priority date on its certificate of adjudication. And Number 3 had, the most junior, had a 1975 priority date on its certificate of adjudication. They all three wanted to take the same amount of water. If there was

water available, you would first fill the Number 1. Number 2 would be required to allow water to pass through and not take water until you had completed the request of Number 1, before you would get to Number 2. Correct?

A. Yes, sir.

Q. And that's based on the priority date.

A. Yes.

Q. Okay. And then once both Number 1 and Number 2 were filled, then the water would be allowed to pass through to make sure that Number 3 was able to fulfill their permit?

A. Yes, sir.

Q. Now, that is as simplistic as it can be, and it gets much more complicated than that, doesn't it?

A. Yes, sir.

Q. All right. Explain to the Court, if you would briefly --

THE COURT: Hold up just a second.

MR. WILLIS: Go ahead.

THE WITNESS: Oh, I'm sorry.

(PAUSE.)

THE COURT: Okay.

BY MR. WILLIS:

Q. On a regular daily and hourly basis, your role as the water master was to consider each of these elements of all the different permitees or diverters throughout the river and their requests for water. You had to consider where they were

located. Correct?
A. Yes, sir.
Q. You had to consider their priority date. Correct?
A. Yes, sir.
Q. Any restrictions in their permits?
A. Yes, sir.
Q. And that's both on use and stream flow. Correct?
A. Yes, sir.
Q. All right. And all of that had to be done on an ongoing basis, much like an air traffic controller, having to make sure everything was okay.
A. And also depending on what the flows were.
Q. Okay. And you talk about that, and that's by using both visual observation, going through the diversion, monitoring the diversion meters as well. Correct?
A. Yes, sir.
Q. And again, were all diverters required to have diversion meters?
A. About 99 percent of them are.
Q. Okay. The question was asked, in your role as a Water Master, essentially, and I'll misquote it, but that did you consider endangered species when performing your job as far as allocating the diversions. You understood that TCEQ had a water permitting office, and that's essentially TCEQ's permitting office's role, not the Water Master's job. Correct?

A. It wasn't my role, yes, sir.
Q. Your role was to enforce restrictions, whatever those restrictions were on those permits?
A. Yes, sir.
MR. WILLIS: Your Honor, I believe that's enough for this moment. Thank you. I'm going to pass the witness.
THE COURT: Thank you. Y'all are really fantastic in explaining things to me. I appreciate it, both the lawyers and the witnesses.
MR. WILLIS: You want to leave that up?
MR. BLACKBURN: Oh, yes.
MR. WILLIS: I thought you might.
MR. BLACKBURN: Yeah.
THE COURT: That work of art?
MR. BLACKBURN: That work of art, I couldn't pass by the opportunity to --
THE COURT: Do you want to mark that and offer it, by the way?
MR. BLACKBURN: I think we should. And would you sign it as well?
THE COURT: So -- in perpetuity?
MR. WILLIS: All right. What's next on the Defendant's --
THE COURT: 95, 395?
MR. WILLIS: 2 or 395?

THE COURT: 395. It's getting a little warmer in here?

MR. WILLIS: It is to me. I don't know why.

MR. BLACKBURN: Being an artist.

MR. WILLIS: Offer Defendant's Exhibit 395.

THE COURT: That's admitted. You're not going to mark on it, are you?

MR. BLACKBURN: I'm not going to mark on it.

THE COURT: Okay.

MR. BLACKBURN: Although I'm tempted.

THE COURT: Thank you.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. But I would offer a hypothetical -- well, if you assume that the whooping crane is in the, at the bottom of the river below Number 3, and it was a very low flow time, would Number 3 be required to honor the, any aspect of the whooping crane?

A. In particular to the whooping crane?

Q. Yes.

A. No, sir, not that I'm aware of.

Q. I mean that would not be a condition that would be likely to be encountered in any permit in any way?

A. Not that I would be aware of.

Q. Now, can the last diverter on the river, assuming that it has a right to take a certain amount, can they take basically

the remaining water out of the river?
A. Well, most of the water rights have a restriction on them, a diversion rate, so a lot of that might depend on what the restriction is as to how much they could take at a given time.
Q. Let's say I had a diversion rate of 10 cubic feet per second and there was 8 cubic feet per second in the river. Could I take it all?
A. Again, I would have to look to see if there were any riparian water right holders below that. I would have to make sure that they would be able to get some water also.
Q. But unless you went out and found some specific need, I could take the rest of the water in the river?
A. If there was no one else that requested it and you were wanting that water and it was available, yes, sir, I would let you have it.
Q. All right. Thank you. And then --
A. Well, I'll just add, again with the stipulation that we had said that we always try to keep the river from drying up.
Q. Okay.
A. Keep the river wet.
THE COURT: Can I ask you, you don't have anything to do with the permitting process, do you? Are your thoughts requested or your input?
THE WITNESS: The permitting section has everything to do with setting up the permits and the restrictions on them.

THE COURT: Your input is not requested for that?

THE WITNESS: No, ma'am.

THE COURT: Thank you, sir.

THE WITNESS: Well --

MR. WILLIS: We've got a witness on that for you, Your Honor.

THE WITNESS: Excuse me. Your Honor, I was going to say sometimes they'll ask our opinion if they're working on a water right, what the water situation is out there, but that's about the extent of it.

THE COURT: Thank you.

THE WITNESS: Yes, ma'am.

BY MR. BLACKBURN:

Q. Your input is not like formalized as, you know, cover the line item on every permit or something like that?

A. Well, they will send us -- Water Rights would send us a form to ask us what our opinion was, if we had any comments on issuing or amending a water right that was before them.

THE COURT: Well, did you have any input at all on the application for the Aransas Wildlife Refuge for water permit?

MR. BLACKBURN: You're talking about the San Marcos River Foundation for the permit for the water to the bay? Is that what you're asking?

THE COURT: I thought -- remember when we first

started, I said why don't you just -- why don't the whooping cranes just apply for a water permit?

MR. BLACKBURN: That actually was done for San Antonio Bay by the San Marcos River Foundation.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And that permit has come and gone. During your time were your comments asked on the application by the San Marcos River Foundation?

A. I don't remember, sir, to be honest.

THE COURT: That's what I was wondering. Thank you.

MR. BLACKBURN: We'll have others that I can talk to --

THE COURT: Okay.

MR. BLACKBURN: -- and I'm sure they'll present.

BY MR. BLACKBURN:

Q. Mr. Segovia, did I take you in this sequence because you were asking to try to get back to San Antonio, I guess?

A. Yes.

THE COURT: That's all right.

THE WITNESS: My time right now? Yes, sir.

MR. BLACKBURN: Thank you very much.

THE COURT: Enjoy your retirement, after -- are you finished?

MR. BLACKBURN: I am, Your Honor. Pass the witness.

MR. WILLIS: We're done. Thank you.

THE COURT: Thank you, sir. You're excused.

THE WITNESS: Thank y'all very much.

THE COURT: Enjoy yourself for the rest of the week.

THE WITNESS: Thank you, ma'am.

MR. MUNDY: Plaintiffs call Judge Burt Mills, Your Honor.

THE COURT: Enjoyed hearing from you, Mr. Segovia.

THE WITNESS: Thank you, Your Honor.

BURT MILLS, PLAINTIFF'S WITNESS NO. 10, SWORN

DIRECT EXAMINATION

BY MR. MUNDY:

Q. Would you please introduce yourself to Judge Jack, sir.

A. Burt Mills, Aransas County Judge.

Q. Okay.

THE COURT: Thank you, sir.

BY MR. MUNDY:

Q. And what type of Judge are you? Let's be specific.

A. I'm not a Judicial Judge. I'm an Administrative Judge.

Q. You're elected County Judge?

A. Yes.

Q. And if you would, describe in general what your duties are as a County Judge for Aransas County.

A. I'm, well, the CEO of the county, as it were, the --

Q. Run the business, if you will, of the county?

A. I run the business, yes.
Q. And that's an elected position?
A. Yes, it is.
Q. And when were you elected?
A. This last term was January 1st of 2011.
Q. All right. If we could, Judge Mills --
THE COURT: Hold up. Only one Judge per courtroom.
MR. MUNDY: I'm sorry.
THE COURT: That's the way it goes.
MR. MUNDY: Okay.
THE WITNESS: Yes.
THE COURT: Sorry, no disrespect.
THE WITNESS: No problem.
THE COURT: Thank you.
MR. MUNDY: Of course. That was just, that's the common term so that's why I was using that. No disrespect to Your Honor, of course.
THE COURT: It's a record matter.
MR. MUNDY: Certainly. Let me readjust my mind for a second. Mr. Mills --
THE COURT: Reboot.
MR. MUNDY: Reboot. I've got to hit the reset button here.
BY MR. MUNDY:
Q. Mr. Mills, with all due respect to your position, but we

will refer to you as Mr. Mills, sir.
A. No problem.
THE COURT: I've asked them to do that.
MR. MUNDY: Yes, sir.
THE WITNESS: I was Mr. Mills a long time before I was anything else.
MR. MUNDY: Understood.
THE COURT: It's not part of our name, is it?
THE WITNESS: No.
BY MR. MUNDY:
Q. Anyway, that's an elected position, and you're currently holding office?
A. Yes.
Q. Okay. And you're here today with the authorization and on behalf of the County --
A. Yes.
Q. -- as their, the official representative of Aransas County?
A. Yes, sir.
MR. MUNDY: And Your Honor, he will be appearing as a 30(b)(6) witness on behalf of Aransas County, and then I think also offering individual testimony to blend both, but he is a 30(b)(6) authorized witness of Aransas County.
BY MR. MUNDY:
Q. And I should ask, you have received the express

authorization of Aransas County to appear here today and give testimony on behalf of the county government and residents. Is that correct, sir?

A. Yes, I have.

Q. How long have you, yourself, lived in Aransas County? If you will tell Judge Jack a little bit about your background, where you grew up.

A. Well, on my mother's side of the family, I'm the sixth generation in Aransas County. I grew up in Lamar Peninsula, 19 years, so I've been there a while. My family's been there a while.

Q. When did your family settle in that area?

A. My mother's side of the family settled in 1842. My father's in the late '20s, I believe.

Q. 1920s?

A. 1920.

Q. And I know a little bit about an interesting background. When you were a boy growing up, where did you go to school?

A. I went to school in Rockport.

Q. Okay. Then how did you get to school every day?

A. Well, the story last night was by boat, but that was my father.

Q. Okay. Excuse me. So how did he go to school when he was a boy? How did he make the trip?

A. The kids went by boat, and then by car into town.

Q. Okay. So they get from the house, drive to the edge of the water --
A. And get on a boat if the weather was permitting, they'd go across and go to school. And if weather wasn't permitting, they had to stay in town with friends, couldn't go home.
Q. That wasn't that long ago history.
A. That wasn't that long ago.
Q. You, yourself, grew up in Aransas County?
A. Yes.
Q. And as a young man, once you finished school, did you serve the country?
A. Yes, I did.
Q. What branch of the military were you in?
A. Air Force.
Q. And what, if you would, tell us about your service to the country.
A. Well, I spent some time in South Dakota, didn't like it. So the only way to get out of there was to go to Vietnam, so I spent a year in Vietnam.
Q. When did you serve in Vietnam, sir?
A. 1968.
Q. And I think you had the not opportune timing. When did you arrive in Vietnam?
A. Twenty-two days before the Tet Offensive of '68.
Q. And were you actually -- no disrespect to any of the

fellows in the Air Force whatsoever, but some folks were on the base and never leave. Tell us a little bit about your own personal experience.

A. I was assigned to Da Nang Air Force Base, but I volunteered for an off base ammo storage point for security, and that was the wrong move.

Q. And then Tet Offensive happened?

A. Yes.

Q. The, what was it like, just briefly. Give us just a few moments of what it was like to be actually out on the line.

A. Well, you didn't know where your friends were, except if they were within sight. Nights were the scariest, but it was an experience that I won't forget.

Q. How long were y'all under direct assault?

A. At one time it was eight days.

Q. You came back to, came back -- finished your tour and came back. Where did you return to?

A. I returned to Rockport. Well, actually, when I left -- when I left Vietnam, I went to Athens, Greece, for two-and-a-half years.

Q. Okay.

A. And then I came home.

Q. All right. And when you returned to Rockport, tell us a little bit about what you did for a living and your life.

A. I went into business. I bought my father's partner out of

a restaurant there in Rockport.
Q. Well-known restaurant in Rockport. What's the name of it?
A. Duck Inn.
Q. Okay. How long --
THE COURT: Oh, that's really good.
BY MR. MUNDY:
Q. My personal experience, particularly loved the stuffed flounder, so I don't --
A. Yeah.
Q. Did you come up with the recipe or inherit it?
A. No, that was Mr., or actually it was Mrs. Duck's recipe. That's how it got its name, Mr. and Mrs. Charlie Duck.
Q. So that was their real name?
A. Right.
Q. I never knew that. Anyway, you were the owner and ran that business for how long, sir?
A. Thirty-eight years.
Q. And now explain to us how you came to be involved in politics and an elected official. A big jump from running the Duck Inn to where you are now running the County.
A. Yes, sir. My oldest son --
THE COURT: Well, you know, I don't think it is a big jump.
MR. MUNDY: Well --
THE COURT: I mean, from customer service to --

MR. MUNDY: Well, I --

THE COURT: -- responding to the needs of the people.

MR. MUNDY: Absolutely.

THE WITNESS: That's true. My oldest son, when he was nine years old, informed me that he wanted to go into the Air Force Academy. I said, "Okay." And how do you do that? I checked around with several different people, and I was told I needed to get involved in politics so I'd meet some people that knew some people. So consequently, I ran for City Council and then for Mayor and served in that position for eight years.

THE COURT: Did he go to the Air Force Academy?

THE WITNESS: Pardon me?

THE COURT: Did he go to the Air Force Academy?

THE WITNESS: Yes, he did, with a lot of help from a lot of good friends.

THE COURT: That's really great.

THE WITNESS: And now he's stationed in Del Rio.

MR. MUNDY: Well, that's --

THE COURT: And getting ready to retire, unlike me.

BY MR. MUNDY:

Q. So that seems to be a recurring theme in this trial, people never quite make it out of retirement here. But we thank you for being here, sir.

Now, if you would, I'd like to focus. What is your earliest memory of the whooping cranes growing up as a boy?

A. Oh, living in Lamar, the whooping cranes were a big part of our life, because they were so close and the wildlife refuge was so close. I remember when I was six or seven years old, which was a few years ago.

Q. Now, the -- when you were a young boy and a young man, how common was it to see a whooping crane?

A. They were very scarce. Some years you could go without seeing any, unless you were a real whooping crane enthusiast and went looking into the brush for them. But they were very scarce, not very many of them.

Q. And then we've heard from some of the Whooping Crane Recovery Team members, Dr. Chavez, Dr. Archibald and others about how they've been quite successful in more recent decades. And if you would, from your time running the restaurant, when did you take over the Duck Inn?

A. 1971.

Q. Okay. From your time, personal observations, personal experience running that from 1971 till -- when did, when did you --

A. Six months after I was elected to office the first time --

Q. Until relatively recently?

A. 2007.

Q. I'm trying to do the math. 2007, then you took on your current duties. From your experience from 1971 till 2007, what was your experience about people coming to your restaurant who

were, if you will, whooping crane tourists?
A. Well, from the beginning --
Q. Did you ever have any?
A. From the beginning, the whooping cranes have always been a tourist draw for Aransas County. And over the years, the more whooping cranes that were coming down, the more tourists would come to Rockport and Aransas County to see the whooping cranes.
Q. And if you would, explain to Judge Jack how the whooping cranes, the tourists for the whooping cranes, how they filled the role seasonally, say, that winter season, the importance of those tourists in the winter season, compared to, say, the summer tourism draws for Aransas, the businesses.
A. Well, every year, when I first went into business, you could tell -- after the summer was over, you could tell there was a big lull until the whooping cranes got there. And then business picked up, because people would come to Aransas County for the whooping cranes.
Q. Okay. And were it not for the whooping cranes, there's no other particular winter draw for the tourists?
A. Duck hunting, goose hunting, but that's a draw, but I think the whooping cranes out do anything else.
Q. And through the years, the whooping crane tourism is a winter draw? Is that --
A. Yes.
Q. I think you just said that's continued to increase.

A. Yes. Every year it gets better.
Q. And how, if you will, how does the, the having, being the host of the whooping cranes, if you will, how does that affect the community's self-image? How important is it to that community, its self-awareness of the cranes or the importance of the cranes?
A. People from all over the world come to Aransas County to view the whooping cranes and learn about them. When I was in business, Japanese, Chinese, Europeans, even some Russians come by every once in a while, from everywhere. England, a lot of people from England come in, Canada, South America.
Q. And understanding -- your job is understanding the business of the County, running the business of the County. Do y'all have -- obviously, what's your tax rate on sales in the County? What's the sales tax rate for the County?
A. Sales tax rate for -- now, you got me on that one.
Q. 1 percent?
A. It's 1 percent, yeah, for the sales tax.
Q. Okay. Then obviously have other tax mechanisms, property taxes --
A. Right.
Q. -- and things like that. Has the -- the importance of tourism, how -- well, let me step back one step. Back in the '70s and '80s, there used to be ship building business in the Rockport area generally. Correct?

A. Yes.
Q. And are those still there?
A. No. I believe our main industry right now is tourism.
Q. Okay. And how, if you can, I don't know if there's a specific way to measure, but just quantitatively, your own personal observation, how important is the crane-driven and related tourism as compared to other components in the winter season?
A. I believe the cranes bring in around 5 to $6 million a year in tourism dollars.
Q. Okay. In direct spent dollars?
A. Uh-huh.
Q. Is that a --
A. Yes.
Q. I see you nodding your head.
A. Yes.
Q. You have to speak up.
A. Yes, I'm sorry.
Q. That's all right. And then the County directs, obviously directly receives a benefit from the sales tax of that. But those dollars also have a multiplier effect as they're redirected through the community?
A. Oh, certainly.
Q. What type -- when those tourists come to visit, the whooping crane tourists come to visit, obviously they pay to go

on a tour boat. Is that right?
A. That's right.
Q. What other types of businesses do they spend their dollars in when they come to visit Aransas?
A. Hotels, restaurants, all the shops downtown, grocery stores, fishing boats. They go, you know, find other things to do besides just looking at whooping cranes.
Q. Okay.
A. They stay a while. In the winter time, they stay a while.
Q. And the Chamber of Commerce and the U.S. Fish and Wildlife have done studies trying to determine the number of visitors they believe come each year to see the cranes?
A. Right.
Q. And how, what's the estimate that you've --
A. 70 to 80,000.
Q. Per year?
A. Per year.
Q. And the direct dollars, the initial dollars spent is how much?
A. Well, they say it's about $97.2 million a year. I think it's more.
THE COURT: What do you mean, the spin off of the --
THE WITNESS: The tourist dollar.
THE COURT: Sorry, the direct is 5 to 6 million?
THE WITNESS: For the whooping cranes, yes.

THE COURT: For the whooping cranes.

THE WITNESS: Correct.

THE COURT: But --

THE WITNESS: For the 1 percent sales tax for the year.

THE COURT: Oh, just for the sales tax. I'm sorry.

MR. MUNDY: And Your Honor, for the record, there is a -- he has done a declaration, if you need it, that captures the facts and figures. I believe it is Document Number 213 in the Court's files.

THE COURT: That's been admitted?

MR. MUNDY: It's not been admitted, but he did it initially as a declaration, was filed. But so I would --

THE COURT: But that's not part of -- it's okay. I can look at it. If you want to reoffer it --

MR. MUNDY: We will do that. I'd ask the Court take judicial notice of it at this time if you need it. I'm just giving it to you as a reference. I'm giving all the facts and figures now, but --

THE COURT: Got it. Thank you. Go ahead. I won't interrupt on that.

BY MR. MUNDY:

Q. Anyway, so it's 70 to 80,000 visitors annually that are estimated to come see the cranes for that specific purpose?

A. Yes.

Q. And their initial direct dollar expenditures are 5 to 6 million?
A. Yes.
THE COURT: In sales tax?
THE WITNESS: No.
MR. MUNDY: Of dollars spent.
THE WITNESS: Dollars spent.
BY MR. MUNDY:
Q. In the community, dollars spent --
A. Yes.
Q. -- from those whooping crane tourists is estimated to be 5 to 6 million?
A. Yes, sir.
Q. Those dollars then have a multiplier. They get respent. Like say if they go to an art gallery, buy something, the art gallery owner buys groceries, the art gallery owner buys property. They continue to have a multiplier effect through the community?
A. Yes.
Q. Okay.
THE COURT: And that is the 95 million?
THE WITNESS: Yes.
BY MR. MUNDY:
Q. The 97 million --
A. 97.

Q. -- is total tourism dollars spent annually, the current estimate by the Chamber of Commerce.
A. Yes.
Q. Okay. But you have a feeling that's an underestimate?
A. I believe it's an underestimate.
Q. The county has a direct sales tax of 1 percent?
A. Yes.
Q. Do you believe, in your observation and experience living in that community, that the marquis bird, if you will, the whooping cranes, add to the, or enhance property values, such as for vacation homes?
A. Most definitely.
Q. And a comparable small community immediately next up the coast I think probably would be Port O'Connor would be the next?
A. Yes.
Q. How do property values in number, just sheer number of vacation homes compare in Rockport, say, to Port O'Connor?
A. I don't know the numbers, but I can tell you that, well, one subdivision in Aransas County is 35 percent of our tax base.
THE COURT: Is that -- Rockport is in Aransas County?
THE WITNESS: Yes.
THE COURT: Okay. And that's what you're talking about?

THE WITNESS: Yes, ma'am.
THE COURT: What's that community called on the canals?
MR. MUNDY: Key Allegro.
THE WITNESS: Key Allegro.
THE COURT: That's the one you're talking about. Right?
THE WITNESS: That's the one I'm talking about.
THE COURT: Okay.
BY MR. MUNDY:
Q. That's primarily a vacation home community?
THE COURT: They're second homes.
THE WITNESS: Second homes, yes.
MR. MUNDY: Second homes.
BY MR. MUNDY:
Q. But the importance of the perception of high quality environment, high quality community is what helps attract that type of property owner or buyer, if you will?
A. I believe so, yes.
Q. Okay. And those second homes, that marquis community, the Key Allegro community, very important driver in property tax revenues to the county?
A. Very important.
Q. You said it was, what, 35 percent, I think, of the annual --

A. Of the tax base.
Q. I'm sorry, sir?
A. Of the tax base, yes.
Q. Okay. Now, I'm just looking through my notes. I'm just checking my notes here briefly, sir.
Looking here, I think there's been an estimate from the County, is it correct, that for each $100 in tax revenue in Aransas County, that $26 comes from the tourist --
A. Yes.
Q. -- from the tourism dollars?
A. Yes, sir.
Q. Okay. So roughly 26 percent is directly from the tourism dollars spent, is your understanding?
A. That's what we estimate, yes.
Q. Okay. Now, just to kind of connect the dots, Aransas County, the official governmental entity of Aransas County, has joined The Aransas Project, who is the named party bringing the case. Is that your understanding?
A. That's true.
Q. And y'all, as the Commissioners, voted and approved?
A. We did that, yes, unanimously.
Q. And you understood at the time that you would be participating in an effort which would culminate in this effort in this case?
A. Yes, we did.

Q. Okay. And that was expressly authorized, and you're here today with that understanding and in that official capacity?
A. Yes, sir.
MR. MUNDY: Thank you very much for your service and your time here today, sir.
THE WITNESS: Thank you.
THE COURT: It was good to meet you.
THE WITNESS: Good to meet you.
THE COURT: Ms. Snapka?
MS. SNAPKA: Yes, Your Honor.

CROSS-EXAMINATION

BY MS. SNAPKA:
Q. Good morning, Mr. Mills.
A. Good morning.
Q. You told us that you grew up at Lamar Peninsula. Is that correct?
A. Yes.
Q. All right. And I'm going to make a guess. That was in the '50s? Or '60s?
A. Yes.
Q. Okay.
A. You did real good.
MR. MUNDY: I think I ought to be objecting right about now.
THE COURT: We're both of a certain age apparently.

BY MS. SNAPKA:

Q. When you grew up in Lamar, you participated in a lot of the things that you could enjoy out there, like fishing. Is that right?

A. Fishing and hunting, yes.

Q. Did you do any crabbing?

A. Yes.

Q. A lot of people did crabbing back in those days, didn't they?

A. Yes.

Q. The crabbing pretty much continued by folks in the area up until recently, didn't it?

A. Yes.

Q. Just last year I think it was, there was a decision made to strictly enforce the crabbing, the illegal crabbing that was going on in the refuge. Is that right?

A. Yes, it is.

Q. We heard some testimony about that yesterday. Up until then, the residents, the locals that were used to going out there and crabbing were pretty much continuing to crab unabated. Right?

A. I believe so, yes.

Q. The, and just briefly, because I'm trying to remember growing up here. The Key Allegro subdivision actually was developed in the late '50s. Am I correct about that?

A. You're right.

THE COURT: Is that right? I didn't know it was that old.

BY MS. SNAPKA:

Q. It is a fairly, if I'm correct, Mr. Mills, it's --

A. Actually, I believe it started in -- well, late '50s, 1960 actually.

Q. Right. It, I think the plans for development of Key Allegro were sort of drawn up in the late '50s --

A. Uh-huh.

Q. -- as an upper scale retirement community or a second home community. Is that your understanding?

A. Yes.

Q. All right. And at that time the draw was not, for development of Key Allegro, was not necessarily whooping cranes when it was developed and populated by those folks, was it?

A. Probably not. It was developed for second homes.

Q. Right. It was developed for people who wanted to, to winter on the coast and to enjoy the coastal area. Correct?

A. Right.

THE COURT: Wouldn't that be part of it?

BY MS. SNAPKA:

Q. Mr. Mills, back in the late --

THE COURT: Not just the boat parties up and down the canals, but --

MS. SNAPKA: That's right.

THE COURT: -- the whooping crane?

MS. SNAPKA: Well, my point is, he was talking about Key Allegro.

THE COURT: Yeah.

MS. SNAPKA: And when Key Allegro was developed, the number of whooping cranes was actually only in the, I think, twenties or thirties at that point.

THE WITNESS: I don't remember how many in the '50s.

THE COURT: Does anybody remember? Does that sound right?

MS. SNAPKA: We have those numbers.

THE COURT: I know it's in the exhibits, but --

MR. BLACKBURN: It's in the exhibits. We think it's more in the neighborhood of forties or so.

THE COURT: Well, whatever.

MS. SNAPKA: Whatever it is.

BY MS. SNAPKA:

Q. In other words, whooping crane tourism was not, was not the purpose for the development of Key Allegro. Correct?

A. No. You're right.

Q. Now, when you purchased the, and started to run the Duck Inn, that was in, you said, 1971?

A. Yes.

Q. All right. And you noticed that people were coming in.

Is that correct?
A. Yes, I did.
Q. To see the whooping cranes? At that time in 19, in the early '70s, I think the whooping crane population was in about the fifties. Is that right?
A. Got me again.
Q. Okay. If that's what the record shows it is, you have no reason to disagree with that, do you, sir?
A. No.
Q. Okay. And I think your testimony was, is that the whooping crane tourism, even in the fifties, at the population of the fifties, there were people coming to see the whooping cranes. Is that right?
A. Yes, they were.
Q. And has Aransas County, to your knowledge, done marketing to try to broadcast more about the whooping cranes?
A. Aransas County itself? No. But in conjunction with Chamber of Commerce, most definitely.
Q. All right. And every year that you're aware of, the whooping crane tourism has increased. Is that correct?
A. Yes.
Q. Are you able to quantify for this Court how much there would be a, some sort of a financial harm if the whooping crane numbers were to drop?
A. As the whooping crane numbers were going up, the tourism

and the bird watchers, whooping crane watchers went up. So I'm saying if it went down, that would probably happen also.

Q. Are you able to quantify for this Court how much it would be?

A. No.

Q. You're just assuming it would be a, if it goes down, there would be a general trend down. Is that correct?

A. Right.

Q. Are you expecting that to happen any time soon?

A. It could very well happen, with what's going on right now.

Q. I understand that there's always a concern. Do you have a reasonable expectation of it happening very soon?

A. Personally?

Q. Yes.

A. No.

Q. No? Is that your testimony?

A. Yes.

Q. As the chief executive officer of Aransas County, I understand that, that you've stated that Aransas County voted to become a member of TAP. Is that correct?

A. Yes.

Q. Who invited Aransas County to become a member of TAP?

A. Who invited?

Q. Yes. How did Aransas County become aware of TAP's existence and purpose?

A. One of the Commissioners brought it to our attention, and we, we discussed it in Commissioner's Court and voted on it.
Q. Which Commissioner was that?
A. Charles Smith.
Q. How much in dues did Aransas County pay to TAP?
A. Nothing.
Q. Has Aransas County made any contribution to TAP?
A. No.
Q. Voluntary contribution?
MR. MUNDY: Well, can we have this clarified as financial, as opposed to -- for example, his time here today is a contribution.
MS. SNAPKA: Oh, and I --
BY MS. SNAPKA:
Q. Please, Mr. Mills, I understand that your time is very valuable, and I want to try to move this along. But what I'm saying is Aransas County has made no financial contribution, either in the way of dues or just giving money to TAP. Is that correct?
A. That's correct.
MS. SNAPKA: I'll pass the witness, Your Honor.
THE COURT: Thank you.

REDIRECT EXAMINATION

BY MR. MUNDY:
Q. Just very, very briefly, sir. Just explain, if the cranes

were dying due to a decline in the health of the bay overall, how does that affect businesses and economies and the perception?

A. Dramatically.

Q. Would you please explain that to Judge Jack?

THE COURT: I think I've got it.

MR. MUNDY: Okay. We'll leave it at that.

THE WITNESS: Well --

MR. MUNDY: Thank you.

THE WITNESS: -- the bays are very important to, to our area. And without clean water and getting the salinity right, everything's cratering. I mean, not only the whooping cranes, the fishing, hunting, everything. Shrimping. Shrimping's already gone. Oystering is gone this year. So yes, it's very important. And yes, the whooping cranes are important, but the clean water is even more important.

BY MR. MUNDY:

Q. Is it fair to say it goes to the existence of your community?

A. Of the whooping cranes -- yes.

Q. Thank you, sir.

A. You're welcome.

MR. MUNDY: May he be excused, Your Honor?

THE COURT: Again, thank you very much, sir.

THE WITNESS: Thank you.

MR. WAITES: Ray Kirkwood, Your Honor.

THE COURT: How are we coming on the Plaintiff's witnesses?

MR. BLACKBURN: These are Plaintiff's witnesses.

THE COURT: I know, but how many more?

MR. BLACKBURN: Oh, these are the standing witnesses. There will be one more this morning, and then we will get back to the expert presentation case. We should, I think, depending on cross, certainly be well through the end of the day Friday.

THE COURT: Okay. So we have to plan on what to do on Monday, my jury day. Are you all planning to be here on Monday?

MR. WILLIS: Your Honor, I was curious, and I haven't spoken to co-counsel, but just trying to line up witnesses, but did you have any intention on any Saturday court?

THE COURT: I'd be glad to do Saturday.

UNIDENTIFIED SPEAKER: We can't get our witness --

MR. WILLIS: Okay. I was afraid we might not -- I'm sorry. I spoke too fast.

THE COURT: Okay.

MR. WILLIS: But we were just curious. Okay.

MR. BLACKBURN: I mean, would you consider the day off on Monday? Or would you prefer to take the --

THE COURT: I hate to have everybody standing by. I mean, there's just -- and then I hate to lose the day also if I

go over and there's no jury.

MR. BLACKBURN: I must say, I --

THE COURT: What is your preference? Think about it, and we'll talk about it tomorrow.

MR. BLACKBURN: Okay.

THE COURT: I just want to throw that out. Because sometimes you go and they say, "Well, come back tomorrow morning."

MS. SNAPKA: Your Honor, I'm going to, I'm going to make a pretty safe bet that you're not going to get picked.

THE COURT: I never have been. But what happens is I keep going and going and going, and they say, "come back in the afternoon. Come back tomorrow morning." Somewhere I get a call from somebody that says, "Nobody wants you on their jury."

MR. MUNDY: Call Judge Mark Davidson in the 11th District in Houston. He had the same bet, and he ended up serving for two weeks on a jury.

THE COURT: No, that does happen. I think Judge Head served on a jury --

MS. SNAPKA: He did.

THE COURT: -- before I was on the bench for a couple of weeks once.

(Witness sworn.)

MR. WAITES: You now have two.

THE WITNESS: Yeah, I found it in the closet this

morning.

RAY KIRKWOOD, PLAINTIFF'S WITNESS NO. 11, SWORN

DIRECT EXAMINATION

BY MR. WAITES:

Q. Good morning. Would you please tell Judge Jack where you live?

A. I live --

THE COURT: I'd like his name.

BY MR. WAITES:

Q. I'm sorry. Would you please state your name?

A. My name is Raymond Kirkwood. I'm known as Ray to everybody.

Q. And Mr. Kirkwood, with that now established, would you please tell Judge Jack where you live?

A. I live at 331 --

THE COURT: Oh, no address.

BY MR. WAITES:

Q. Just, I'm sorry, just what town?

A. I'm sorry. Okay, I live in Rockport.

THE COURT: Thank you.

MR. WAITES: Thank you.

THE COURT: It's for your own protection.

THE WITNESS: Okay.

BY MR. WAITES:

Q. And did you grow up in the Rockport area?

A. No, I did not. I grew up about as far away from here as you can get and still be in Texas. I grew up in Sherman County, Texas, way up in the northern tier of the Panhandle.
Q. And to your knowledge, were there whooping cranes in Sherman County, Texas, when you were growing up?
A. I never saw one while I was there, although I knew about the whooping cranes that, when I was there. Because when I was in elementary school, I always subscribed to the Weekly Reader, and every fall, it seems like, there was an article about the whooping cranes in the Weekly Reader. And I was intrigued by that and kind of followed them through that mechanism for a long time.
Q. Okay. And as you got older and your reading got more sophisticated, tell the Court a bit about your education and your professional career that followed.
A. Okay. I grew up on a farm and ranch. I went away to what's now called West Texas State A&M, was at that time known as West Texas State College. I graduated there in 1961 with a degree in physics. Shortly after graduation, I went to work for the Department of Army at White Sands Missile Range.

I worked there for several years in electronic counter-countermeasures. Moved from there to Fort Monmouth, New Jersey, to work in a photo optics technical area. Terrible culture shock moving from New Mexico to New Jersey. But while I was there, volunteered as a civilian to go to Vietnam in two

different capacities.
Q. Well, as a civilian in Vietnam, you weren't in a combat zone, were you?
A. There was no such thing as a non-combat zone in Vietnam in '67 and '68.
Q. Okay. And I believe you told me last night you were in a free fire zone, and you had the job of stringing up a balloon with lights pointing down to your direction --
A. Yeah.
Q. -- on the ground?
A. One of the, one of the things that I did there was to try to introduce an antenna mounted on a 33-foot tethered balloon. And I was testing it for the electronics command. The way we were testing it at that time was I was in a small boat in the middle of the Cochin River outside of, well outside of Saigon. And at night, that was a free fire zone. But it was on, the balloon was on a thousand-foot tether in the air --
THE COURT: That ended with you?
THE WITNESS: Huh?
THE COURT: That ended with you?
THE WITNESS: Yes.
MR. WAITES: It gets better.
THE COURT: And it had lights all the way down the string?
THE WITNESS: Yes, ma'am. The Air Force insisted

that we follow FAA rules, and that means that at night I had to put flashing lights on the bow and stern of the balloon, and at 50 feet intervals all the way down that tether line. So I'm sitting there looking up at this flashing light saying, "Here he is, here he is."

BY MR. WAITES:

Q. Well, at some point you came back to the States and eventually retired from your work --

A. Actually, I came back to the States -- that stint in Vietnam got me an opportunity to work for the TRADOC Combined Arms Test Activity at Fort Hood, Texas. And I moved from New Jersey back to Texas, Central Texas. I spent several years there testing, essentially, or originally to test things that were en route from the United States to Vietnam. Sort of a filter situation, so that we didn't send junk over there, as we were wont to do at that time.

Towards the end of that period, I got into software development and helped build -- I led the team that built one of the major software simulations of warfare that has been used. We used it, we invented it as a mechanism for testing intelligence processes in the upper echelons of the military.

We discovered during an early test that the upper commands, the general officers, they have no way to practice their art without getting people out in the field and getting them shot. We decided -- they thought maybe there was a better

way. And so we invented some simulations that allowed them to practice their art in, quote, command post exercises.

I worked on one in particular that is, as far as I know, is still used today, but it's so classified I can't talk about it.

From there, I, after about 23 years or so with government service, I joined a government contractor and continued principally the software development and in exercise support using those simulations.

Q. Okay. And then at the point at which you retired from your career in the defense industry, I think you were living in Virginia with your wife. Is that right?

A. That's correct. I was living in southern Virginia.

Q. And how did you make your way to Rockport?

A. Well, I decided to retire in 1999. My wife and I got in the car, and we started at Key West, Florida, and we toured the entire Gulf of Mexico within the boundaries of the United States, wound up at Brownsville. And in that tour, came through the Aransas County and decided this may, must be the place.

Actually, what happened, Your Honor, was we were driving along the road, and the bar ditch was filled with roseate spoonbills, big, beautiful pink birds. And I said, "It can't be all bad with that kind of scenery."

So we moved to Aransas Pass, then subsequently from there

to Rockport.
Q. And about what year was that?
A. I moved to Aransas Pass in 2000, and moved to Rockport a couple of years ago.
Q. Did you at some point become a member of The Aransas Project?
A. I did.
Q. And why did you do that?
A. Because the objective of Aransas Project seemed to be to protect the habitat of the whooping crane. And that's a crucially important thing to me personally and to the things that I do now.
Q. Okay. And you have not made any financial contribution to the Aransas Project. Is that correct?
A. I have not.
Q. Now, at some point, did you get interested in working with whooping cranes?
A. Yes. Shortly after we moved here, my wife and I looked around and said, you know, "I don't know or understand the plants, the animals or anything about this environment here," and launched off to find a way to learn about it.

We saw an ad in the Corpus Christi newspaper for a class of Texas Master Naturalists, and I called up and I said, "Have you got room for two more?" And they said, "Yes." And at that time we joined the Texas Master Naturalists.

The function of the Texas Master Naturalist organization is to develop a corps of knowledgeable volunteers knowledgeable in their local ecology, their local area. And then in return for the knowledge they provided us, pay that back with volunteering, in educating or improving or protecting that ecology.

Q. Okay. And as part of the Texas Master Naturalist program, did you learn more about whooping cranes?

A. Yes. A member of the local chapter, the chapter, the Mid Coast Chapter of the Texas Master Naturalists was a man named Ray Little. Ray is a, an older fellow. I think he's, it's hard to tell how old Ray is, but he claims to be in the mid eighties, and he's been a birder since he was about six or seven years old.

At that time Ray was the narrator on the tour boat, the *Wharf Cat*, which in the winter time took people out to see the whooping cranes and to talk about the whooping cranes. Ray invited me to go on a trip with him, which I did, and I became immediately intrigued again with the whooping cranes.

Ray at that time had been, for years, the interpreter, narrator on the *Wharf Cat*, and he was ready to slow down and start doing some other things, and mentioned that he wanted to get out of the business. And I said, "Hey, Ray, can I do that?" And he said, "I think you can."

So I spent a short internship under Ray, and then I became

the narrator on the tour boat, the *Wharf Cat*, taking people out to see the whooping cranes.

Q. How did you learn all the information that you needed to know in order to be a good narrator about whooping cranes?

A. I did a lot of study. I read the book written by Robert Porter Allen, the man who discovered where the whooping cranes were nesting. I read the Recovery Plan for the whooping crane, both the original and the modified one, the current one. I did a lot of talking to people. I read everything that Tom Stehn had ever written.

And then as I got into it, I continued to study. George Archibald, Dr. Archibald comes down once a year, takes a ride on the *Wharf Cat*, and of course I mined him for every piece of information I could get out of him.

My background is in science. I like to study. I like to know what I'm talking about. And that's what I did.

Q. You --

A. I also --

Q. I'm sorry, go ahead.

THE COURT: Did you find the book? Did you overnight that book?

MR. MUNDY: I, the answer is no, but this one absolutely can stay with the Court, and I will find an alternative copy. I will track one down. But I'm happy to leave this one with the Court.

MR. BLACKBURN: We have found the books. They just aren't here yet.

THE COURT: Okay.

BY MR. WAITES:

Q. Were you still answering?

A. I was going to also say I also studied how to do nature interpretation. I went through a class, and I practiced that art as well.

Q. You mentioned having read the book by Porter Allen. Let me show you Plaintiff's Exhibit 372. From this distance, can you tell, is this the book that you were talking about?

A. That looks like it, yes. The copy I read resides in the Corpus Christi Library under close supervision. So I had to sit in the library to read it, but yes, that's the book.

THE COURT: And that number exhibit again is?

MR. WAITES: 372.

THE COURT: Plaintiff?

MR. WAITES: Plaintiff's 372, Your Honor.

THE COURT: Thank you.

BY MR. WAITES:

Q. Okay. So you were a narrator. Let me make sure I have that right. Narrator. You were narrator on the *Wharf Cat*.

A. That's correct.

Q. So where does the *Wharf Cat* -- and the *Wharf Cat* is still in operation. Correct?

A. Oh, yes, it is.
Q. Okay. Where does the *Wharf Cat* go on its tour?
A. Okay. The *Wharf Cat* generally, when you're doing a whooping crane tour, leaves from Rockport, although one day a week it leaves from Port Aransas, but five days a week, it leaves from Rockport. It drives out to the Intracoastal Waterway and then turns and goes up the Intracoastal Waterway through the Black Jack Peninsula, all the way from Aransas Bay, up to San Antonio Bay, turns around and comes right back down the Intracoastal Waterway, returning to Rockport.
Q. Okay. You mentioned five days one route and one day a week another route. So that *Wharf Cat* operates six days a week during the whooping crane season?
A. That's correct.
Q. Okay. And was there a period of time when you were narrating on the *Wharf Cat* all six days of the week?
A. Yeah, for several years I was going out on the *Wharf Cat* six days a week.
Q. And so that several hundred days a year you were narrating on the *Wharf Cat*?
A. That's true. After that, of course, I dropped back to three days a week, simply because it gets kind of tiring to stand up and talk for four hours six days a week.
Q. I think there are probably people in the courtroom who could attest to that.

From your experience as a narrator on the *Wharf Cat*, what opportunities does that, do the routes that it takes present to see whooping cranes in a normal year?

A. As we enter the Aransas National Wildlife Refuge, there in the Intracoastal Waterway -- I'd like to more fully describe the trip, if you don't mind.

Q. Please do.

A. As we're leaving Rockport, we will see birds. We do bird watching on the way out there, although the trip is a whooping crane tour, not a bird watching tour. I, in general, describe the quality of the bay and how important it is to the citizens of Aransas County that that water be clean and pure. I talk a little bit about the ancient history there, the Karankawa Indians that lived there, the original, origin of the Intracoastal Waterway.

And then as we enter the Aransas National Wildlife Refuge there, on your left is the, let me call it the mainland, the Black Jack Peninsula itself. On the right there are some islands that were created when they dug the Intracoastal Waterway.

Now, all along the left-hand side, starting about, almost as soon as you get into the refuge proper, there are territories of each family of whooping crane right there on the Intracoastal Waterway. Starts at the waterway, and in general, then extends well back away from the waterway.

Q. Let me just ask a question right there. When the boat is going on its normal path in the water, approximately how far is it to the close edge of the whooping crane territory?
A. If we put the bows up against the edge of the waterway, we're touching the whooping crane territory.
Q. Please continue.
A. Each family of whooping crane -- of course, the whooping crane is a very family-oriented bird -- owns, I like to say they own a small ranch down here in South Texas. Each family, on an average, carries about 300 acres of property that's theirs, and they live there, they defend that territory from all other whooping cranes. They'll share it with the egrets and the herons and whatever else, but they will assiduously and vigorously defend it from other whooping cranes.

And that, those territories these days extend the length of Black Jack Peninsula. There are many other territories outside, you know, on San Jose Island, on Matagorda Island, over on the other side of San Antonio Bay that we don't get to. But right there along the Intracoastal Waterway, you know, Black Jack Peninsula, we see them all.

Q. Okay. I had asked you a little earlier, and you had rightly wanted to flesh out a little more what the tour is like, but what, what is the tour experience like for the customers on the *Wharf Cat*? What are they seeing?
A. Well, in the first place, you're seeing a very, in a

normal year, a very healthy, active estuarial system, with lots of activity out there, lots of different birds.

THE COURT: I need to ask you, how many years have you been the narrator on the *Wharf Cat*?

THE WITNESS: Since -- I think about eight years.

THE COURT: Thank you.

MR. WAITES: And Your Honor, he, we'll get to this, he is not narrating this year. He is doing some other work that we'll talk about.

THE COURT: Okay. Now, I interrupted you in the middle of the tour experience.

THE WITNESS: Okay. Again, by this time, I've talked about the, you know, the Karankawas and the Intracoastal Waterways. And as we're going in, the very first property that we get to, the very first territory that we get to close is the, belongs to the Lobstick family of whooping cranes. Daddy Lobstick is the oldest whooping crane in the flock.

THE COURT: How do you spell that?

THE WITNESS: L-O-B-S-T-I-C-K.

THE COURT: Thank you.

BY MR. WAITES:

Q. They were well-known one year for having a set of twins, weren't they?

A. Yeah. Although they're very old, they are still very productive. And the whooping crane ordinarily will only bring

a chick down every other year, and even on those years will only bring one chick. But on rare occasions when things are just right up in their nesting ground up at Wood Buffalo National Park in Canada, they'll have enough resource up there to feed up the second chick and bring them down.

It's an unusual occurrence, and it was a great year that year, because the Lobstick and their twins were right there where we could park and watch them, and occasionally they would come as close as from me to you to the boat. And that was a fantastic experience for me, as well as my customers.

Q. Do you recall what year that was?

A. No, I don't recall.

Q. Okay. Did I interrupt you? Or should we move on?

In a normal year, do your customers get to observe whooping cranes eating blue crabs?

A. Oh, yes. At, right there next to the waterway, there are a lot of little shallow ponds that are a part of the estuarial system. And in those ponds are, there are usually a lot of blue crab in there, particularly in the fall and up to the first part of the winter. And we will often see whooping cranes reach down and pick up a crab and bring him over to the side and dissect him and eat him.

Q. Now, just a few minutes ago, I believe you were in the courtroom. Mr. Mills testified that he believes that if the whooping crane experience was not as rich for tourists, that

tourism dollars would go down.

Let me ask you, from your experience as a narrator on the *Wharf Cat*, is the ability to see the cranes up close important to the tour experience that the *Wharf Cat* offers?

A. Yeah, of course it is. It's, it's exciting to see the whooping crane at any distance. They're such magnificent animals. But, of course, it's much more rewarding if you get a close personal interview with a whooping crane.

Q. If there were fewer cranes to see or if the cranes were in uplands farther from the *Wharf Cat*'s tour route, based on your experience, would that -- would you expect that would impact the tour business?

A. That would be my expectation, yes. Because again, they're, the customer's expecting that rich experience of a close encounter. If they don't get it, then eventually the word gets out that it's probably not worth the trip down. So I would expect to see it go down.

Q. And I told the Court a moment ago that you were not guiding on the, or narrating on the *Wharf Cat* this year. What are you doing instead?

A. I have a contract with the International Crane Foundation to monitor whooping cranes on a Corps of Engineers project up by Sea Bright, I'm sorry, Sea Drift, Texas. They're refurbishing one of the repositories for the dredge that they're digging out, that they will dig out of the waterways up

there.

That repository runs and abuts the critical habitat of the whooping crane. And myself and others are there to make sure that if a whooping crane comes within a thousand feet of the activities going on, that we stop the activities and give the whooping cranes a chance to do whatever it is they want to do and retire.

THE COURT: And this is the International Crane what?

THE WITNESS: Foundation.

THE COURT: Thank you.

MR. WAITES: And Your Honor, that's also the organization that George Archibald was connected with.

THE WITNESS: Yeah, George was a co-founder of the International Crane Foundation.

BY MR. WAITES:

Q. Mr. Kirkwood, are you being compensated by the International Crane Foundation for the work that you're doing?

A. Yes, I am.

Q. Okay. If there were no whooping cranes, would there still be a need for you to do the job that you're doing for the International Crane Foundation?

A. Absolutely not.

Q. Now, in addition to your paid work as a narrator and for the International Crane Foundation, do you also volunteer at the Aransas National Wildlife Refuge?

A. Yes, I do. I do a good deal of volunteering there.
Q. Well, in fact, you're wearing a pin. What is that pin on your lapel?
A. That's a Presidential -- I'm sorry -- Presidential Award for Volunteerism. It was awarded to me for documenting over 5,000 hours of volunteer work with the Texas Master Naturalists.
Q. Okay. With regard to the refuge, you're currently a volunteer at the refuge?
A. Yes, I am.
Q. Okay. And what do you do at the refuge?
A. I do a number of things or have done a number of things over the years. I assisted them in doing some small mammal surveys. Generally, in the summertime my wife and I will go out to Matagorda Island in search for Kemp's ridley sea turtle nests. Kemp's ridley is the most endangered of the sea turtles.

I give frequently, or often give presentations out there about either sea turtles or whooping cranes or other things. I lead some of the van tours that go on out there in the winter time, which culminates generally with taking the tourists up to the observation tower there on Black Jack that give them a chance to see at least one family of whooping cranes from that observation tower.

Q. In your experience, do most of the visitors to the refuge

come to see the cranes? Is that why they're there?
A. I will -- I don't know about most, but a great, great number of them come specifically to see the whooping cranes. The whooping cranes are world famous. And on the tour boat, for instance, I get -- I've had people from China. I've had people from Japan, Correa. The orientals revere cranes, and so they go out, they take long trips, very expensive trips to come down and ride on a tour boat to go see the whooping cranes.

Many people from Europe, all over the United States, South America. You know, it's a world renowned destination to come to see the whooping cranes.
Q. Now, in your opinion, just as one man, is that -- is how we take care of the cranes in the United States important to our image in the rest of the world?
A. Oh, yes, I really truly believe that it is, it's crucial. You know, we caused the decline of the whooping crane. Historically, there may have been as many as 10,000 whooping cranes alive back before 1800. Due to the activities of human beings, that crashed, and in 1940, '41, there were only 15 in this, left in this flock. There's a handful over in Louisiana that didn't breed. But this flock, the 15 was the entire breeding stock of whooping cranes left in the world.

And due to the hard work and dedication of so many people, we've now brought them back up to, we hope maybe 300 this, this winter. And that, you know, taking care of that whooping crane

and the estuarial system that supports them is, to my mind, a crucially important factor in our status in the world.

Q. We've discussed two different job --

THE COURT: Thank you.

MR. WAITES: I'm sorry, Your Honor.

BY MR. WAITES:

Q. We discussed two different jobs that you've had relating to whooping cranes and your volunteer work. Do you plan in the future to keep working with the cranes in some capacity?

A. If I can at all, I will.

Q. Aside from economically, how would it affect you if the cranes were gone?

A. I would be devastated. This is such a gorgeous animal, and he is king of the, he's king of the estuary out there.

THE COURT: Or she.

THE WITNESS: I'm sorry?

THE COURT: Sorry. Nothing. Go ahead.

BY MR. WAITES:

Q. "Or she," she said.

A. Oh, true. And they're, they're the umbrella, they're the mark of, that says that we either have or do not have a functioning, healthy ecosystem out there.

Q. Earlier I asked you to describe what you would see during a normal year from the *Wharf Cat*. During your work as a narrator on the *Wharf Cat* --

THE COURT: Sorry.

BY MR. WAITES:

Q. During your work as a narrator on the *Wharf Cat*, was there a winter when, based on your observations, the cranes did not behave characteristically?

A. Oh, yes. The winter at the end of the drought, during the drought. You have to understand, the whooping crane can't drink water when it gets too salty. And when --

Q. Before we go on, I just want to make sure we're clear on what year that was.

A. It's the winter of '08-'09.

Q. Thank you.

A. 2008-2009.

Q. So please tell the Court what you observed.

A. The water gets very salty during drought, because of the lack of fresh water flowing into the estuarial system. The whooping cranes can't drink it. They can drink it up to maybe 20 parts per thousand, and then if it gets saltier than that, they have to go someplace else to get a drink.

For reasons that seem to confuse the biologists, the blue crab disappear. They're just not there. And the blue crab is a critical component of the whooping crane's diet. So he also has to go someplace else to get something to eat or get sufficient food to eat to survive. And therefore, he's no longer in his habitat. He's no longer in his home territory.

He's way over there some place, in the, in the, what we refer to as the uplands, away from the marshes and the salt flats.
Q. And is that what you observed during the tours in the winter of 2008-2009?
A. Yes, it was.
Q. What about seeing cranes eating blue crabs? Was that different from other years?
A. You almost never saw them get a blue crab that winter. Rare occasions, we did, but for most of the time, no. They weren't -- they even eventually almost gave up looking for them. We'd see whooping cranes out in the bays, where they're getting probably razor clams or things of that nature, or in the uplands, where they're looking for acorns or mice or snakes or something, or just not in the ponds, where you would expect them to find crabs, blue crabs. They can find fiddler crabs out in the wetlands, but --
Q. You mentioned as you were describing the early part of the tour, before you got to the whooping crane territory, you talk about other birds. Without going into great detail, are there a lot of birds in the area, aside from whooping cranes?
A. Sure. You, you will always, in the winter time, you see lots of ducks. You'll always see great egrets. You'll always see snowy egrets. You quite often will see reddish egrets. You'll see great blue herons, night herons, and then all kinds of, quote, shore birds, peeps. The estuary is just teeming

with life.
Q. And as far as the number of birds, based on your observations, would you say there are many, many thousands of birds of all types?
A. I would say that's a good number, yeah.
Q. And in all your years of operating as a narrator on the *Wharf Cat* and your observations, have you ever seen a carcass of one of those birds?
A. Not from the boat, no.
Q. Okay.
A. You have to understand that everything out there is either a predator or a scavenger. And when something gets weak, he gets attacked. And when he dies, he disappears. He's gone. My experiences walking the terrain, you almost have to step on them before you see any kind of debris left from that. They just disappear.
Q. You mentioned earlier that as you go on the tour, there are known territories with families of cranes. And is it correct to say that through your experience with the tour, you could identify family units on their territories?
A. Yes.
Q. Okay.
A. Primarily because they're so loyal to that territory, a handful of them are banded, and you can see those bands. But mainly it's because the Lobstick family is on the Lobstick

territory. The Boat House family is in the Boat House territory. And you get to see them, you spend enough time at them, you begin to think you recognize them.

Q. In the winter of 2008-2009, did you personally observe any cranes go missing from their territories?

A. One I'm quite sure of was a chick. He was there on, with his parents on his territory. It was a very unusual kind of year. Birds were not being as loyal to their territory as they could be, or they usually are. But this one family with chick I would see frequently on a trip, and then the chick disappeared. The family was there. I knew it was the family on that territory, because they defended it. But the chick was no longer there. And my assumption is, my conviction is that chick died.

Q. How did that affect you when you came to that conclusion?

A. It makes me sad. Any time any crane disappears, it's a, it's a sad experience. You know, I look, I have grandchildren that I like to take out to show the whooping cranes. When I see that kind of resource starting to disappear, I worry about the future of our generation, or our country.

MR. WAITES: Thank you, Mr. Kirkwood. Pass the witness, Your Honor.

THE COURT: Lunch time.

MR. WAITES: All right.

(Court and Clerk conferring off the record.)

THE COURT: Okay. 1:30.

MR. WILLIS: Your Honor, I wanted to point out to the Court --

THE COURT: You can stand down, sir. Thank you.

MR. WILLIS: Apparently, although I was attempting to answer the Court's questions regarding certificates of adjudication and riparian rights, apparently I was not entirely accurate on that. I did the best I could on my explanation. I prefer to leave it up to the witnesses that are going to take the stand.

THE COURT: You told me you weren't an expert on that.

MR. WILLIS: Okay.

THE COURT: You were just trying to give me an overview.

MR. WILLIS: Okay. Thank you.

MR. BLACKBURN: Yeah, we won't hold them to it.

(Recess from 12:01 p.m. to 1:30 p.m.)

THE COURT: Thank you. You may be seated. Ready?

MS. SNAPKA: Yes, Your Honor.

THE COURT: Go ahead.

MS. SNAPKA: Thank you, Your Honor.

CROSS-EXAMINATION

BY MS. SNAPKA:

Q. Good afternoon, sir.

A. Good afternoon.
Q. It's my understanding that you came to Aransas, to Rockport, in 2004. Is that correct?
A. I came to Rockport in, to this area in 2000.
Q. In 2000.
A. Yeah.
Q. When did you start volunteering at the Aransas Wildlife Refuge?
A. In 2002-2003.
Q. All right. And when did you become a Master Naturalist?
A. In 2002.
Q. 2002, okay. What I was trying to find out is had you been around long enough to observe the ten-year cycle that was described by Mr. Stehn.
A. I have.
Q. You have?
A. I have, yes.
Q. Okay. In other words, from your own visits to the refuge as well as what you've done, you understand there's a natural ten-year cycle that the whooping cranes have. Is that right?
A. I do understand that, yes.
THE COURT: You can come on -- I was talking to Mr. McCarthy, my cough mate.
BY MS. SNAPKA:
Q. Now, just before we closed, you said that you're sad when

you lose any bird. And I understand that. Any loss of an endangered species, for whatever reason, is distressing, isn't it?

A. It is.

Q. You also, sir, as a Master Naturalist, understand that there's a cycle of life that every living being on the planet goes through. Correct?

A. That's true.

Q. Correct? And isn't it correct that particularly in nature things happen to animals? They can die of old age. They can, they can be, become prey, they can become injured, they can become diseased. You understand all those things. Right?

A. Yes, I understand those things. But when you look at the history of the recovery of the whooping crane, you don't see the violent swings that we saw in 2008-2009. You see little dips about every ten years, due to reasons that I don't truly understand.

Q. Right. And it's important for us to understand what's going on, from a scientific basis, isn't it?

A. Well, of course.

Q. Let me talk to you --

A. Let me amplify just a little bit. I do know by looking at the records that there seems to be a fairly strong correlation between years of low rainfall and years that we lose whooping cranes. To that extent, I think I understand some of that

cycle.
Q. All right. And the low rainfall is, is periods of drought. Correct?
A. That's right.
Q. Now, with regard to your experience, you have become quite an experienced observer of whooping cranes. Am I correct?
A. I believe that's true, yes.
Q. There's an article that you wrote for the *Victoria Advocate*. Do you recall that?
A. I do.
Q. How did you come to write that article?
A. I was, I was perturbed by what I had seen out there in 2008-2009, and I felt like it was incumbent upon me to make my observations known to more than just a handful of people. So --
Q. And you tried to put your, as accurate an impression as possible. Is that right?
A. Yes, I did.
Q. The actual mortality count you got from Mr. Stehn. Is that right?
A. That's correct.
Q. I want to talk with you for a minute about an average regular year. All right?
A. Okay.
Q. With regard -- we've talked a whole lot about wolfberries

and blue crabs. First of all, with regard to the wolfberries, this is a relatively short crop, isn't it?
A. That's true. They generally start ripening in the early fall, October, thereabouts. They will continue to bloom and ripen up until December or so in fact.
Q. All right. Now --
A. And they're also one of the first foods that the whooping cranes, the sandhill cranes consume when they arrive here.
Q. I understand that, sir. I'm just trying to get when it is they -- they fruit in basically in November. Is that right? And some into December?
A. November, December, yeah.
Q. With regard to the blue crabs, usually in December the cranes have consumed many of the blue crabs in the marshes. Is that right?
A. Towards the end of December, well, many of -- yes, they will consume many of them. Whether or not they've consumed a majority of them or not is dependent upon the blue crab crop of the year, of course, and to some extent the weather.
Q. And by "the weather," we understand from listening to the experts that the blue crabs really go away in January and February and don't come back until early spring. Is that right?
A. The typical cycle is for them to become scarce in January, first part of February, start coming back into the marshes end

of February, March time frame. That's when we start seeing the whooping cranes catching more crab than they did in January or early February.

Q. Because there are just not any blue crab out there. Correct?

A. They're not catching them anyway. I don't know how many there are.

Q. Right. And one of the things that you said, if we could maybe look at that article in the *Victoria Advocate* --

THE COURT: What exhibit number is it?

MS. SNAPKA: It is Exhibit Number --

MR. TAYLOR: Defendant's Exhibit 3, Your Honor.

BY MS. SNAPKA:

Q. If we can highlight where you're talking about the whooping crane is an omnivore. We understand that omnivore, that whooping cranes can and will eat everything. Right?

A. That's correct.

THE COURT: When was the article, Ms. Snapka?

MS. SNAPKA: It was published in the *Victoria Advocate* in March of 2010. Is that correct?

THE WITNESS: Yes, ma'am.

THE COURT: Okay, thank you.

BY MS. SNAPKA:

Q. March 22nd of 2010.

A. Well, that's when Tom Stehn forwarded his copy of that to

me. It was actually published a little earlier, I think.
Q. All right. So you wrote it maybe a little bit before then, but it was --
A. Published on March 17th, it says.
Q. Okay, thank you. All right. If we can go back to the part that we were looking at, "It can and will eat nearly anything, but in order to thrive, it needs an abundance of blue crabs which are found in the waters along the coast during the winter."
By that you were just making a general statement. You weren't trying to say it's all winter long. It's -- we talked about what the cycle is. Correct?
A. That's correct.
Q. And it says, "Not just any blue crabs. Size matters, and silver dollar size is about right." And that's what you've observed, isn't it?
A. Yes. Because, you know, the small crab, they can pick it up, doesn't take much to get it down their throat and into their stomach.
THE COURT: About dollar size, you mean the whole crab including legs, or you mean --
THE WITNESS: No, just the carapace.
THE COURT: The body?
THE WITNESS: Yeah, the body.
THE COURT: Got it.

THE WITNESS: But if it gets to be full size, they'll go ahead and pick him up.
BY MS. SNAPKA:
Q. Oh, I understand.
A. And then they'll bring him over to the side of the pond and downsize him, you know, rip his legs off and eat those and beat on the shell until they get it, pull it up --
THE COURT: Okay.
THE WITNESS: -- and get it choked down, too. They'll take any size crab, but yeah, they like, they like the smaller ones. They're abundant. They're easy to get. They're easy to swallow.
BY MS. SNAPKA:
Q. And you said silver dollar size is about right?
A. Yeah, maybe a little larger.
Q. Okay. Now, what I'd like to do, if it's all right with you, but just because I want to make sure that we have this for the record, I'm going to trace around --
THE COURT: Are you in competition with Mr. Coover?
MS. SNAPKA: I am. Mine is even more detailed.
THE COURT: It is fabulous.
MS. SNAPKA: Could I have the Defendant's exhibit number, please?
MR. TAYLOR: 396.
THE COURT: 394 -- 5. Sorry. 395?

MR. TAYLOR: I think 396 is the next one, Your Honor.

THE COURT: Okay, thank you.

MS. SNAPKA: Okay. I've marked the sheet of paper --

THE COURT: Wait a minute. Thank you. 396 is admitted.

BY MS. SNAPKA:

Q. I've marked this sheet of paper that I drew on Defendant's Exhibit 396. Is that correct?

A. Yes.

Q. And when you said, "Silver dollar size is about right," that's what you meant as far as the size of the body. Is that correct?

A. Yes, but you know, that's not a hard and fast rule. That's just, you know, I used that term to give people a picture of a small crab.

Q. I understand, sir. I just, I wanted to make sure that we knew what you were talking about when you were reporting this important information to, in the *Victoria Advocate*.

Now, we know that in their summering grounds, they don't have blue crab, do they?

A. No. They've got a lot of other things, but they don't have blue crab.

Q. Tell me about that. Tell me about some of the other things that whooping cranes eat.

THE COURT: Is it going to be different from the list

we've already had?

MS. SNAPKA: In this regard, Your Honor, he has listed mammals as one of the things that they eat.

BY MS. SNAPKA:

Q. And I'm interested in the range of mammals that you've observed them eating.

A. I don't know that I've ever observed them eating a mammal. I would not expect them to pick up anything larger than, say, a cotton rat. Typically a field mouse would be about the right thing.

Q. All right.

A. Don't know that I've ever seen them, but I have read that they do in fact eat small mammals if they can get to them.

Q. All right. And one of the -- one of the ways that, particularly in times when they think food will be scarce, is that there are prescribed burns. Is that right?

A. That's -- that may not be, that's probably not the only reason there are prescribed burns, but that is one of the reasons for a prescribed burn, yes.

Q. That is one of the reasons, and those prescribed burns are done in the uplands. Is that right?

A. That's correct.

Q. In '08-'09, there was a lot of movement of cranes that year. Isn't that true?

A. That is true.

Q. And you and Mr. Stehn had many conversations and e-mails about the degree of movement. Correct?
A. We had several.
Q. And part of the reason for the movement was the prescribed burns. Are you aware of that or --
A. I'm not sure I believe that. The reason for the movement is the prescribed burn uncovered other sources of food. And since they were not finding food in the wetlands down there, they were then moving to the wetlands to try to find something to eat.
Q. And that started as early as November in '08-'09. Correct?
A. I believe that's correct, yes.
Q. You, I think you said that the whooping crane range has expanded as the flock size has expanded. Is that right?
A. I have said that. You know, each family of whooping crane needs about 300 acres of ground, on an average. Some more, some less. They don't seem to be squeezing that down as there gets to be more and more of them, so we've now got about 75 mated pairs, and it's the mated pair that claim the territory. You multiply 75 times 300 and compare that to the stuff designated as critical habitat, and you can see that we're just about out of territory that is under protection for the whooping crane.
Q. And additional territory under protection is needed for

the whooping crane. Isn't that right?
A. I believe that to be true.
Q. And that would help out tremendously, wouldn't it?
A. It would, provided that it's the right kind of territory, estuarial territory, with the right salinities of water and the right mix of plants and animals in that water.
Q. You never flew the, on the aerial surveys with Mr. Stehn in '08-'09, did you?
A. I did not. I offered to, but he didn't want me there.
Q. Okay. So basically you had to rely on his reports. Is that right?
A. That's correct.
Q. And you were on an e-mail list that he would send his reports to when his count was complete. Is that right?
A. That's correct.
Q. And in '08-'09, I don't know, were you in the courtroom when his aerial surveys were discussed?
A. I was not.
Q. Nonetheless, you have read his aerial surveys that were sent to you. Is that right?
A. That's correct.
Q. In virtually all of those aerial surveys, without going through each one, you're aware, are you not, that the aerial surveys he described as, as guesstimates or used equivocal terms. In other words, he just couldn't be sure because of the

degree of movement.

THE COURT: Yes?

MR. WAITES: Your Honor, I'm going to object. This is not within the scope of direct.

THE COURT: Sustained.

MR. WAITES: Thank you.

THE COURT: Move on to something else.

BY MS. SNAPKA:

Q. Are you aware of the range that he flew the next year?

MR. WAITES: Same objection, Your Honor.

MS. SNAPKA: I'll move on.

THE COURT: Okay.

BY MS. SNAPKA:

Q. I believe you discussed with Counsel on direct the number of crabs. Is that correct?

A. I don't recall.

Q. What I had here was that there was a shortage of food in '08-'09?

A. I did say that.

Q. Now, in November when the cranes are coming down from their, for their, from their migration --

A. They should have, most of them should have been here before November.

Q. Right. And so they're eating a lot of crabs in November. Is that correct?

A. If the crabs are available, yes.
Q. All right. If we could look at the crab count for November of '08 done by Mr. Stehn, are you familiar with that at all?
A. Yes, I am.
Q. And in November of '08, the crabs that he discovered on his transect in November --
MR. WAITES: Your Honor, objection. The witness was merely testifying to his personal observations. This is beyond the scope of that.
MS. SNAPKA: Your Honor, they --
THE COURT: Sustained.
MS. SNAPKA: If I may, Your Honor, they presented him as a Master Naturalist who is out there observing every day, and he's made some conclusions.
THE COURT: I thought this was a standing person.
MR. BLACKBURN: That's correct.
MR. WAITES: That's correct, Your Honor. He was simply telling about his background.
THE COURT: Okay, wait a minute. He did talk about the lower crab population in '08-'09. You can question him about that.
MS. SNAPKA: Thank you, Your Honor.
THE COURT: I'm mistaken. Thank you.
BY MS. SNAPKA:

Q. Mr. Kirkwood, in --

THE COURT: But I have not accepted him as an expert of any kind.

MS. SNAPKA: And I am not questioning him as an expert, Your Honor. I'm simply testing his observations.

THE COURT: Okay.

BY MS. SNAPKA:

Q. In November of '08, Mr. Stehn, the person who you rely upon as an observer out there -- let me just clarify that. You're relying on Mr. Stehn in your, in your interest in whooping cranes, as someone who is trained to observe. Is that right?

A. I'm not sure I understand that question.

Q. Sure.

THE COURT: I'm not sure he came up with any observation relying on Mr. Stehn's data. I didn't hear that in direct.

MS. SNAPKA: All right.

THE COURT: Have you come up with any observation relying on Mr. Stehn's data?

MS. SNAPKA: Other than mortality.

THE WITNESS: I rely on Mr. Stehn for the counts.

THE COURT: Do you use that in your work in any way?

THE WITNESS: Yes, in my presentations when they --

THE COURT: Okay.

THE WITNESS: -- when he talks about --
THE COURT: So you use it in your presentations, okay.
BY MS. SNAPKA:
Q. All right, Mr. Kirkwood. Let me see if I can start over again. In November of '08, Mr. Stehn sighted 23 crabs. Is that right?
A. That's what that report says, yes.
THE COURT: No, it didn't. It was the '08-'09 period altogether that 23 were missing.
MS. SNAPKA: Your Honor, based upon Table 16, the monthly blue crab survey --
THE COURT: I'm sorry, I'm mixing crabs and cranes.
MS. SNAPKA: I'm sorry.
THE COURT: Go ahead. I won't interrupt again.
THE WITNESS: By the way, I did not count on Mr. Stehn for any of the crab counts, if that's germane.
BY MS. SNAPKA:
Q. Okay. Nonetheless, sir, in November he counted 23 crabs, is that correct, in his --
THE COURT: What does that mean?
MS. SNAPKA: My understanding is that Mr. Stehn was going out doing transects to see how many crabs he sighted, to determine a relative gauge of crab abundance. The point is, is that in '08-'09, there were 23 crabs in November, when they

were coming down and feeding off of them before they left for the winter. In '09-'10, he counted many, many fewer, and there were, there was only one mortality during that season. It doesn't follow.

THE COURT: Yes, it does.

THE WITNESS: It does --

THE COURT: Because your assumption is based on incorrect information. It doesn't -- this is a sustainable population. Either they sustain throughout the winter and reproduce or recreate or they don't. November counts don't match. If you had November, December, January, February, March with those same counts, I would accept that hypothesis. But that is not, that will not lead to that conclusion. So I'm going to tell you that right now.

MS. SNAPKA: Except that the crabs don't stay there in January and February. Everybody has said that. The crabs leave.

THE COURT: Actually, I don't think they have. They said they need them all year round. There are times when they were lower, times when they are higher. But we don't have a list of the population for the entire period, so I will not accept that assumption as fact.

MS. SNAPKA: All right.

THE COURT: Now, if you can get together those tables, I'll accept them.

MS. SNAPKA: I will see what we have, Your Honor.

THE COURT: Okay. They may be somewhere around.

MS. SNAPKA: We will certainly look for them.

BY MS. SNAPKA:

Q. Mr. Kirkwood, you said on direct that you're a scientist and that you like the science of things. Correct?

A. That's correct. My background is in physics, which is the real science.

Q. The study of matter through space and time. Correct?

A. Yes.

Q. The assumptions that you make or the conclusions that you come to should be verifiable, should they not?

A. Yes.

Q. And they should be reliable, should they not?

A. To the extent the data is -- yes.

Q. To the extent that your data is correct. Isn't that right?

A. Yes.

THE COURT: I'm sorry, I don't -- I'm not getting what you're doing here, because he has not had expert data to share. He has some anecdotal observations, and that's all I have accepted from him.

MS. SNAPKA: All right. And Your Honor, my only point with this witness was that if his contention is '08-'09 was the worst year on record, where you would expect great

mortality --

THE COURT: He never said that. He never said that. Did you ever say that?

THE WITNESS: Not here today, I did not.

THE COURT: Okay.

MS. SNAPKA: So perhaps the conclusion that he has is not that '08-'09 was that bad.

THE COURT: He said it was bad, but that -- but he's only been here since '02. It's not like he has 30 years of experience like Stehn. I don't recognize his observations as anything but anecdotal is what I'm telling you. So to shoot them down is not necessary.

MS. SNAPKA: All right. Thank you, Your Honor. That helps in my direction.

BY MS. SNAPKA:

Q. Did you -- I'm trying to remember if this came out on direct. With regard to the crab population and your observations, in '09 and '10, there were some rains. Correct?

A. Yes, there were.

Q. And they came too late in the year to aid the crab population. Is that right?

A. That's my belief.

MR. WAITES: Objection, Your Honor. That's beyond the scope of direct.

THE COURT: It is, but that's okay to ask. I mean,

we're not -- I can filter that out. Because she's entitled to call him again on direct and ask the same questions. So ask it now.

BY MS. SNAPKA:

Q. I'm sorry, what -- your response to that, sir, was the rains came too late to assist the crab population in '09-'10. Is that right?

A. That was my belief, yes.

Q. You testified about how you would feel if, if there, if there were not cranes, and I understand that. That is not -- absent disease or an oil spill, a destruction of the crane habitat is not going to happen in -- you don't expect that to happen this year. Correct?

A. This year, I would say it is unlikely. In the near future, it may be.

Q. But as far as the, as this season or next season, you don't really anticipate that. Is that correct?

A. No, I don't expect it in the next year or two.

Q. You weren't in the courtroom when Mr. Archibald was here, I don't believe. Were you on the refuge when Mr. Archibald came to tour?

A. I -- George has been on the *Wharf Cat* with me several times, yes.

Q. And did he go this last time when he came in?

A. This, just recently?

Q. Yes.
A. I was not with him at that time, no.
Q. Okay. But you have been on the refuge this year, this season. Correct?
A. Yes, I have.
Q. Okay. Have you seen what the results of the aerial surveys and the counts are this year?
A. As far as I know, there have been none this year.
Q. None?
A. I have not had any, have not seen any anyway.
Q. It's December the 8th, I believe. Isn't that pretty unusual that they wouldn't bother to send a plane up to count?
A. That's -- I have no idea why they would not have, but --
THE COURT: I haven't heard -- has somebody said that they haven't?
MS. SNAPKA: It's, we don't have any counts from this year. They usually start flying in November. And we haven't heard of any counts.
MR. BLACKBURN: Your Honor, to our knowledge, there have been no counts this year that we have received records of. That's Fish and Wildlife Service. Mr. Stehn, as you know, is no longer with the agency. I, you know --
THE COURT: I got it.
MR. BLACKBURN: That's the extent of my knowledge.
THE COURT: Yes, sir?

MR. FERNANDES: Well, that's about all we know, and we suspect that the methodology has been changed this year and they're flying fewer -- that's our suspicion, but we'll still --

THE COURT: Well, do you have any -- have you talked to anyone about that?

MR. FERNANDES: Your Honor --

THE COURT: Have you got anybody here to tell me that the methodology has changed?

MR. FERNANDES: What happened --

THE COURT: Yes or no?

MR. FERNANDES: No.

THE COURT: Okay.

MR. FERNANDES: Well, just so my answer is a full answer, one of our experts submitted recommendations to improve those aerial surveys. Whether or not they've done that or not, that's what I don't know, so -- one way or the other.

THE COURT: I suspect they're having trouble finding somebody to do them.

MR. BLACKBURN: And money.

BY MS. SNAPKA:

Q. So as far as you're aware, Mr. Kirkwood, as somebody who's out there frequently, right now we don't have anything other than an estimate in excess of 300 whooping cranes. Is that correct?

A. That's all I have.

MS. SNAPKA: I'll pass the witness, Your Honor.

THE COURT: Thank you, ma'am.

REDIRECT EXAMINATION

BY MR. WAITES:

Q. Mr. Kirkwood, you were just asked about this year. And you've been out to see the cranes this year?

A. Yes, I have.

Q. You testified earlier about unusual movements of the birds in 2008-2009. How do your observations this year compare to 2008-2009?

THE COURT: Let's not go there. I just don't think that's appropriate.

MR. WAITES: No further questions.

THE COURT: I wouldn't let her go there about his expertise, and you shouldn't be going there. It's one thing about anecdotal things, but enough already.

MR. WAITES: Understood, Your Honor. No further questions. Thank you.

THE COURT: Ms. Snapka?

MS. SNAPKA: Yes, Your Honor.

THE COURT: Finished?

MS. SNAPKA: Nothing further, Your Honor.

THE COURT: Thank you, sir. You're excused.

MR. IRVINE: Call Albert Johnson to the stand.

THE COURT: Okay.

(Witness sworn.)

THE COURT: What's wrong? Has he got fresh water?

MR. MUNDY: That's what I was checking.

ALBERT JOHNSON, PLAINTIFF'S WITNESS NO. 12, SWORN

DIRECT EXAMINATION

BY MR. IRVINE:

Q. Please state your name for the record.

A. Albert Johnson.

Q. And could you tell me what town you live in?

A. I currently live in Rockport.

Q. And are you a member of The Aransas Project, the Plaintiff in this case?

A. Yes, I am.

Q. When did you join The Aransas Project?

A. Shortly after they started rolling.

Q. Okay.

THE COURT: After they started what?

THE WITNESS: After they organized.

THE COURT: Oh, okay.

THE WITNESS: Yes, ma'am.

BY MR. IRVINE:

Q. Do you recall roughly what year that was?

A. No, I became aware from one of the Commissioners, and the judge that was here earlier is my cousin, so he and I talked

about it, so -- the County was going to support them, and I thought that it would be good to also be there.

Q. Thank you. So you own a place in Rockport. Do you also own another property?

A. Yes. We own a small ranch on the Lamar Peninsula.

Q. Can you tell me the name of that ranch?

A. It's known as the Johnson Ranch.

Q. And can you describe roughly where on Lamar the Johnson Ranch is?

A. It's adjacent to the wildlife refuge. It would be a shoebox or rectangular piece of land that would be adjacent on their south fence line.

Q. So you're neighbors with the refuge?

A. Yes. We share a common fence.

Q. You share a common fence with the refuge?

A. Yes.

Q. And do you know the name of that part of the refuge? Because each of the refuges have different names, units.

THE COURT: Lamar Peninsula?

THE WITNESS: Cow Chip would be that --

THE COURT: Cow Chip?

THE WITNESS: -- water feature.

THE COURT: Okay. Just like it sounds?

THE WITNESS: Yes.

THE COURT: Okay.

BY MR. IRVINE:
Q. Is that part of the Lamar unit perhaps?
A. Yes.
Q. Okay. And can you describe to the Judge, after you bought the property, what happened to certain portions of that property?
A. We bought the property in 1999, and I believe there was around 850 acres. We conveyed 245 acres more or less that were wetlands to The Nature Conservancy. It later took about two years, and it went forward to the U.S. Fish and Wildlife. We retained 545 acres of upland, and we put a conservation easement on that a couple of years after we sold the wetlands, maybe in about '04, with Carter Smith. And we retained a 10 acre tract in the middle of that to build our homestead on.
Q. So you've conveyed a portion of the wetland to Nature Conservancy, and then you put a conservation easement on a significant portion of the remainder of the upland property?
A. Yes. And they did in fact purchase the wetland.
Q. Who purchased the wetland?
A. The Nature Conservancy, with GLO money, and I believe we got, seems like about 96,000.
Q. Okay. And do you know what date that portion of wetland that you passed on to Nature Conservancy was then passed on to the refuge?
A. Late in the year in '04, I believe.

Q. Okay.
A. '03 or '04.
THE COURT: All of it? Okay. You're saying "yes"?
THE WITNESS: Yes.
THE COURT: You have to say it out loud. I'm sorry.
THE WITNESS: Sorry, Your Honor.
THE COURT: You're not used to this.
THE WITNESS: I'm very nervous.
THE COURT: Don't be. I mean, you know, all the -- you should look around, the wall, the chairs, you all paid for this. This is your courthouse.
BY MR. IRVINE:
Q. Can you explain to the Judge why you sold a portion of your land to Nature Conservancy and why then it was acquired by the refuge? What was on that piece of land?
A. When we first bought the land, we were unaware of the significant whooping crane habitat that was there, and we were shocked at the number of cranes and the activity. We were surprised. It was a bonus. But I immediately recognized that I was not in a position to police or control that properly, and that was why my thinking went in the direction of conveying it.
Q. And so when you conveyed it, was there a whooping crane territory on that portion of wetland that you sold?
A. Yes.
Q. How many cranes there?

A. There's a pair of cranes there that I've had a love affair with since '99, and they've been very, very prolific. It's been a wonderful 12 years.
Q. Are these the cranes that Mr. Stehn's report sometimes refer to as the Johnson Ranch pair?
A. That's correct.
Q. And so that wetland that you conveyed is now part of the refuge, but it is adjoining to your remaining property?
A. That's correct.
Q. And you watched over the years many juveniles come and be raised on that territory?
A. Many pairs actually.
Q. Many pairs?
A. Yes.
Q. Is it not true that that pair of Johnson Ranch cranes is one of the most productive in the flock?
A. They're very near the top, I would believe.
Q. And are the cranes, when they're in the territory, are they visible from your property?
A. Often.
Q. So you can look out onto the wetland and see the cranes. Can you describe for the Judge the business that you operate on the Johnson Ranch?
A. We bought the ranch, we built a small efficient two-bedroom house, and it was for a personal retreat. It was

on borrowed money. We soon began to think about cash flow, and so we began to lease that, and we put a deer feeder up to feed the wildlife, and very shortly the cranes arrived. So I immediately called Tom Stehn, and it's been an evolution, I guess you would say, over a ten or twelve-year period.

Q. And what is the name of that business?

A. Crane House.

Q. And you rent it out to what kind of people?

A. Tourists, photographers, naturalists. We try to support any crane research. We're friendly with all the researchers. They have the run of our land.

Q. Okay. So can you name any well-known photographers that have come down to your ranch?

A. We published a book with A&M, Klaus Nigge, National Geographic. Some people, John Martel in Rockport, various others. Some wish to remain somewhat anonymous. I don't understand that.

Q. And other guests at your Crane House there are bird watchers, nature enthusiasts?

A. Yes. We have our guest, they're currently in the audience today.

Q. He's getting an eye full. Is the ability to see whooping cranes the reason many guests visit the Crane House?

A. Without a doubt. It's phenomenal.

Q. And do you and your wife receive income from renting the

Crane House?
A. I think we may have grossed around 40,000 on the operation last year, and it's kind of a way to own a small ranch and pay your taxes, I guess you might say. We're probably still a little negative cash flow on the deal.
Q. And can you tell the Judge what your occupancy rate is at the Crane House?
A. During crane season, about 101 percent.
Q. 101 percent. Are there people who call months and months in advance of the crane season, trying to get bookings?
A. My wife is with me today, and she's the manager, and she has the worst job in the world, because people fight over certain dates and times. And we're terrified of a double booking, if you will. It doesn't, doesn't happen, but we try to be very attentive to our guests.
Q. So from the start of the crane season, which is roughly October, sometime mid October through to --
A. November.
Q. November?
A. November, early November.
Q. Through to about April?
A. Yes, sir.
Q. You are booked solid every single night?
A. Yes.
Q. Do you think you would be booked solid if there weren't

any cranes to be able to be seen from the Crane House?
A. Mosquitoes are bad a lot of the times, so we would not.
THE COURT: There's no market for the mosquitoes.
THE WITNESS: No, Judge.
BY MR. IRVINE:
Q. It wouldn't be as effective going to stay at the Mosquito House, would it?
A. That's right.
Q. Can you tell me where you will be living from next year onwards?
A. We've built a house on that ten-acre tract, and we're 95 percent complete. We'll probably move after the 1st.
Q. And so that is just around the corner from the Crane House?
A. It's about 1500 feet north of Crane House.
Q. And from your house, from the new home that you'll be building -- congratulations, by the way -- you will be able to see the crane territory and the cranes, the Johnson Ranch cranes out there in the marsh?
A. That's correct.
Q. And do you, did you design the house in any particular way so you would be able to watch the cranes?
A. We actually got assistance from Tom Stehn to come up with a design to build a house in the understory to where we would not create a disturbance. He said, "It's my goal to allow you

to live on the land without being a negative influence," if you will.

Q. And do you derive a great deal of pleasure from seeing those cranes out there?

A. Very much so.

Q. And seeing the subadults come around and go?

A. I feel like I've given back, in trying to -- my family is, Judge, or Burt Mills' family, we have the same grandfather, so I feel like I'm giving back to that ecosystem, trying to perpetuate it, if you will.

MR. IRVINE: Thank you very much. Pass the witness.

THE COURT: Ms. Snapka.

CROSS-EXAMINATION

BY MS. SNAPKA:

Q. Mr. Johnson, you indicated that you're a member of TAP?

A. Yes.

Q. When did you join TAP?

A. Shortly after they organized, I believe.

Q. And --

A. I'm not sure of the date.

Q. And did you pay any dues to TAP?

A. Yes, ma'am, I did.

Q. How much did you pay?

A. Whatever the normal dues might be. I'm a home builder and have two ladies that take care of me and write my checks, and

I'm -- often a lot of stuff goes on I don't know all the total details.

Q. And you have feeders on your property. Is that correct?

A. Yes, ma'am, I do.

Q. And that's one of the places that the cranes come to feed?

A. Yes, ma'am.

Q. Do they actively feed?

A. In some instances.

Q. And in '08-'09, you actually saw some juveniles at the feeder. Correct?

A. Yes.

Q. And they were there by themselves acting independent. Right?

A. At times, we have currently seven subadults, and they're much like teenagers. They bounce around, and who knows where they're going to be when.

Q. But particularly with these juveniles that you saw, they were there by themselves. Is that right?

A. At times.

Q. And they were, they had plenty to eat because they had the feeder there. Correct?

MR. IRVINE: Excuse me, Your Honor. I just wanted to clarify. Are we talking about juveniles or subadults? I think there's a bit of a communication gap there.

THE COURT: Yes. Are you talking about subadults or

juveniles?

THE WITNESS: The subadults would be a white bird that might be one to three years old. A juvenile would be brown or auburn color.

MS. SNAPKA: And he, there was a sighting in '08-'09 is the one I'm talking about specifically where the juveniles, the brown ones, were there independently.

BY MS. SNAPKA:

Q. Do you recall that?

A. There may have been one or two occasions. The parents roost maybe 150 yards from there in the marsh. And as the offspring get older, sometimes it looks like to me like it's the first time that mother's going to let the child go to the store by themselves.

THE COURT: Is this late in the season?

THE WITNESS: Later on in the season normally. I would say, my observation in the '08-'09 indicated that the birds were starving to death. And they did things to get food that it was not normal.

BY MS. SNAPKA:

Q. You have a, but you have a feeder there. Correct?

A. Yes, ma'am.

Q. So they were there feeding on your property. Right?

A. Yes, ma'am.

Q. So those weren't starving to death, were they?

A. Well, I'm not sure what they get from the feeder is an adequate nutrition stream for their needs.
Q. Did you see any of the birds die?
A. No.
Q. You certainly didn't report that, did you?
A. No. I would report anything, if a bird was sick or stressed.
Q. So what reports did you make in '08-'09?
A. I communicated occasionally with Tom Stehn. And a State Game Warden lives near my gate and has a feeder under a big, overstory of big oaks. The birds actually flew and went under the tree tops to go eat there, which is a high risk maneuver for a big bird.
Q. And they were doing that because the supplemental feeders were providing them nutrition. Correct?
A. I think they were very hungry that year.
Q. Do you have any e-mails to that effect?
A. I turned in all the e-mails I had when I was deposed, and my laptop crashed and we lost a lot of what we had.
Q. With regard to the Crane House, your income ever since you started operating that has increased every year. Is that right?
A. Not really. I think we're charging 250 a night now, and we may have raised the rates two or three years ago, $25 a night. But it's been fairly stable.

Q. Okay. So the -- in other words, the occupancy has been pretty much fully booked for the last several years?
A. Yes, ma'am, about half a year, and in the hot summer months when the mosquitoes are bad, it's not as attractive.
Q. I should have clarified that. During the whooping crane season, it's booked 100 percent every year. Is that correct?
A. Yes, ma'am.
Q. Give me one moment, please.

MS. SNAPKA: Pass the witness, Your Honor.

THE COURT: Thank you. Anything further?

MR. IRVINE: Nothing, Your Honor.

THE COURT: You may stand down. Thank you very much for coming.

THE WITNESS: Thank you, Judge.

MR. BLACKBURN: Your Honor, we call Mark Vickery.

MARK VICKERY, PLAINTIFF'S WITNESS NO. 13, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Good afternoon, Mr. Vickery. And I'm going to call you "Mr. Vickery," although we've known each other for some time.
A. Yes.
Q. Would you introduce yourself to Judge Jack, please.
A. I'm Mark Vickery. I'm the Executive Director at the Commission on Environmental Quality.
Q. And I'm just going to ask you, if you would, to tell us a

bit about yourself, and how long have you worked with the agency?

A. A little over 24 years. It will be 25 years this next summer.

Q. And what is, just real quickly, education -- what is your educational background?

A. I attended Texas Tech University in Lubbock. I was born and raised in Lubbock, and I have a bachelor's degree in geosciences.

Q. And when you first -- when were you first --

THE COURT: Are you talking about TCEQ? Is that who --

MR. BLACKBURN: Yes, Your Honor.

THE COURT: So you're the Executive Director of TCEQ?

MR. BLACKBURN: Correct.

THE WITNESS: Yes, ma'am.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. And are you a named Defendant in your official capacity in this litigation?

A. I am.

Q. And you're here because I've asked your attorney to make you available, as opposed to being a voluntary witness for TAP.

A. That's correct.

THE COURT: I noticed he got up from the groom's

side, so I got that figured out.
BY MR. BLACKBURN:
Q. So you would be from the groom's side. Is that correct?
A. Yes, that's correct.
Q. Now, you say you came out of Tech with geosciences, or was that a master's degree in geosciences? I'm sorry.
A. Bachelor's degree.
Q. Bachelor's degree. And did you start working for the agency immediately?
A. I did not. I graduated in 1984. I went to work in Midland, Texas, in the oil and gas business.
Q. And kind of picked a bad time to start the oil and gas business, huh?
A. That's correct.
Q. And then what did you do after oil and gas?
A. I started my career in State service with the then Texas Water Commission in 1987.
Q. And where were you first, I guess, were you posted somewhere?
A. I was in Austin at the headquarters.
Q. Oh, you started in Austin.
A. Yes.
Q. Okay. Sorry. And could you just sort of identify over the years your matriculation up to Executive Director?
A. Certainly. I started as an Enforcement Coordinator in the

Hazardous and Solid Waste section. I then moved into management about two years after I began. I was a team leader in the Hazardous and Solid Waste Enforcement area, and then really just climbed the ladder of management in that area.

Later, I became the Director of our Field Operations division. I had a stint in the Waste Tire Recycling Program. I became the Deputy Director for the Office of Compliance and Enforcement. I also served as the Deputy Director of the Office of Permitting and Registration.

Then I became, in 2004, I believe, the Deputy executive Director of the agency. And in 2008, I had the privilege to be appointed the Executive Director of the agency.

THE COURT: In 2008?

THE WITNESS: Yes, ma'am.

BY MR. BLACKBURN:

Q. And can you, in a broad, general sense, I know you have a lot of things that you do, but can you describe what your responsibility is as the Executive Director?

A. Certainly. It's basically to run the agency, the day-to-day operation of everything that we do at TCEQ. I carry out the policies of my three Commissioners. I present recommendations to the Commissioners involving enforcement actions, permits, and again, I basically just carry out the day-to-day functions of the agency.

Q. And as such, are you sort of like chief administrative

officer?
A. I think that's a fair way to put it.
Q. Now, do you have policy discretion, as well as implementation authority?
A. I do.
Q. So in some cases, the policies are left to your decision, but would it be fair to say in many cases it would be the three Commissioners that would set policy?
A. That's correct.
Q. And is it true that the Commissioners are appointed through the political process?
A. They are appointed by the Governor, that's correct.
Q. And yourself as Executive Director, are you appointed by the Governor, or are you retained by the Commissioners?
A. I am hired by the three Commissioners.
Q. And --
THE COURT: Which -- what are the Commissioners now? Tell me that.
THE WITNESS: They're my bosses, Your Honor. They are appointed -- we have three Commissioners. They serve six-year terms. They're staggered. And they're appointed by the Governor and then confirmed by the legislature, through the Senate.
THE COURT: And what are they called?
THE WITNESS: Commissioners.

THE COURT: TCEQ Commissioners?

THE WITNESS: Correct.

BY MR. BLACKBURN:

Q. And could you just name them for the Judge, please?

A. Sure. Your Honor, my Chairman is Dr. Bryan Shaw. We have Commissioner Buddy Garcia and Commissioner Carlos Rubinstein.

THE COURT: So these are all appointments of the present Governor, if they're six-year terms.

THE WITNESS: Yes, ma'am.

THE COURT: Okay. Okay, got it.

BY MR. BLACKBURN:

Q. Now, how do you interact with the Commissioners? I mean, your office is, what, right around the corner from them?

A. Yes.

Q. And do you, on a routine basis, meet with one or the other of them individually?

A. Sure. I mean, and I wouldn't say it was routinely scheduled, but obviously I probably try to go over and see them every day that I can. We do attend briefings with the Commissioners on various issues. Our commission has agenda meetings where they take up items, and obviously I attend those. We also have work sessions where we discuss pertinent matters, and I attend those as well.

Q. And before we go further, let me say, it is not my intention to get into any pending matters before the agency

with regard to permits that are pending or anything like that. If I get close to that, don't hesitate to tell me there's a problem, because that's really not my intention.

A. Understood.

Q. Now, where do you get the budget for the TCEQ?

A. Well, the money that supports our budget comes from a whole lot of different fees that we may assess. We get grant dollars from the federal government. So those monies come to the State, and then we are appropriated money from the Texas legislature.

Q. And how has funding been in the last couple of years? Are you up or down?

A. We're down. It wasn't us specifically. I think all State agencies this last legislative session, in light of the economy, we all made cuts.

Q. And with regard to the Water Master, the South Texas Water Master, is that a sort of a functional sort of line item part of the TCEQ?

A. That's correct.

Q. And where does the South Texas Water Master get their budget from?

A. They, they assess fees.

Q. And those fees come from whom?

A. The users of the water, the appropriated users.

Q. And their budget went down as well, did it not?

A. I suspect it did some. I don't -- I don't think that it went down significantly. The cuts that we took this last legislative session were primarily in our air programs, and more specifically in some pass-through grants that we give out in the air program.

Q. Now, from an organizational standpoint at the TCEQ, is the Water Master part of one of three major divisions? I think you have, what, Air, Water and Waste?

A. That's correct. And their offices, we have an Office of Water, Air and Waste, as you said. We also have an Office of Compliance and Enforcement, and an Office of Legal Services and an Office of Administrative Services. And the Water Master is currently housed in that Office of Water.

Q. Okay. And do you have essentially expertise within the agency in water availability?

A. I wouldn't call myself an expert in water availability.

Q. I'm not asking about you personally --

A. Oh.

Q. -- but within the agency, and under your supervision and control, are there water experts?

A. Yes.

Q. And do they, are they hopefully in the Office of Water?

A. Yes.

Q. And is their responsibility to issue permits for taking or allowing the taking of new water out of the river system? Is

that the province of TCEQ?
A. Correct. We would review those applications and then make recommendations to the Commission.
Q. And just for the record purposes, any new diversions for permitted purposes from the Guadalupe and San Antonio River systems would be permitted by the TCEQ. Is that right?
A. That's correct.
Q. And would you agree that the responsibility for this permit rests with TCEQ because all surface water is the property of the State of Texas?
A. That's my understanding.
Q. Now, I'd like to --
(Counsel conferring off the record.)
MR. BLACKBURN: And I have marked Exhibit 379 -- and I will offer it into the record, but mainly I just want to ask some --
THE COURT: Any objection?
MR. WILLIS: No objection.
THE COURT: Plaintiff's 379 is admitted.
MR. BLACKBURN: And if I could have that Exhibit 379 pulled up, please.
(Counsel conferring off the record.)
MR. BLACKBURN: We seem to be having technical problems.
THE COURT: What's wrong?

MR. BLACKBURN: I'm not sure.

MR. WAITES: Don't know, Your Honor.

BY MR. BLACKBURN:

Q. Do you have a copy, Mr. Vickery, of -- this is the certificate of adjudication that is -- in this case from the Medina River.

THE COURT: Thank you.

MR. BLACKBURN: There we go.

THE COURT: I thought we had our light bulb off.

MR. BLACKBURN: I thought it was a blackout again. You want to go ahead and do the ELMO now?

(Counsel conferring off the record.)

BY MR. BLACKBURN:

Q. Now, this is a sample that hopefully doesn't involve anybody in this case. This is just intended to be a sample permit. This would be a certificate of adjudication -- thank you -- a certificate of adjudication in this case issued on the Medina River. And I would ask you, have you seen permits like this in the past?

A. I believe I have.

Q. And what I'd like to do is just turn your attention to the very last page.

MR. WAITES: No, 2. Page 2.

BY MR. BLACKBURN:

Q. Page 2. Sorry. And I'd like you to look at the last

sentence that, "This certificate of adjudication is issued subject to the rules of the Texas Department of Water Resources." Now, is that a predecessor agency to the Texas Commission on Environmental Quality?

A. I believe it was.

Q. "And is continuing right of supervision of State water resources consistent with the public policy of the State, as set forth in the Texas Water Code." Now, is that not just, I mean, that is standard language in all permits, isn't it?

A. I believe so.

Q. How do you interpret that?

A. Well, the Texas Department of Water Resources doesn't exist any more. It was an agency that was a predecessor agency to us, or to our current agency.

Q. Did you, do you know if the TCEQ assumed the responsibilities of the Texas Department of Water Resources?

A. Well, that was before my time, when I came to the agency, but I believe we assumed some of their duties, but that's, that's been a number of years ago, and I'm very well aware that a lot has changed since then.

Q. So would it be -- let me -- you've told us the extent of your knowledge and understanding of that provision?

A. Yes.

Q. Thank you. And now with regard to permit issuance, would you agree with me that the TCEQ has discretion to either issue

or deny a permit?
A. That's correct.
Q. And would you agree with me that the TCEQ has authority to issue or deny a permit with conditions?
A. That's correct.
Q. Do you agree that the TCEQ has administrative and monitoring responsibilities concerning permitted withdrawals?
A. Yes.
Q. Do you have enforcement authority over this adjudication, certificate of adjudication that was Exhibit 379?
A. I'm assuming it's still in effect, so --
Q. Well --
A. -- if it is, yes.
Q. I'll represent to you that it is.
A. Yes.
Q. So you do have enforcement authority.
A. Yes.
Q. Now, with regard to water that is withdrawn under permit to municipalities, does the TCEQ have any authority to issue or to restrict water use for various purposes? Would you like me to stop for a minute, Your Honor, or --
THE COURT: I think we're, I think we're just now getting it on the small screens.
MR. BLACKBURN: Okay. Just let me stop for a second.
THE COURT: No, actually there's nothing on the

screen at the moment. I think we're okay really. We're not?

MR. BLACKBURN: Are you trying to get your computer up, Patrick?

MR. WAITES: It should be, it should be going out there, but I don't see the --

THE COURT: Well, switch it over to computer mode. Is it on computer mode? Well, switch it back to ELMO and see what happens. See if we at least have the ELMO. Put something on the ELMO and see if we have that.

MR. BLACKBURN: There you go.

THE COURT: Okay. So we're not getting -- can you get yours? We have to toggle over to him.

MR. BLACKBURN: You want me to -- I'm sorry, you want me to --

THE COURT: Are those yours?

(Counsel conferring off the record.)

MR. BLACKBURN: Okay. May I proceed, Your Honor? I think it's going to take them a bit of time, and I will use the ELMO in the meantime.

THE COURT: Thank you, sir.

BY MR. BLACKBURN:

Q. And just along the same lines of these permits and issues, I'm going to show you DX Exhibit 306. I don't think you have a copy of that up there. I believe it's in evidence. It's a, it's a permit to appropriate state water, as opposed to a

certificate of adjudication. Just for example purposes again.

MR. WILLIS: Is it already in evidence?

MR. BLACKBURN: It is, DX 306.

BY MR. BLACKBURN:

Q. And I will simply just -- going the wrong way -- and would just ask you, this is not a certificate of adjudication, but is instead a permit to appropriate state water. And have you seen one of these before?

A. Yes.

Q. And this bears the name of the Texas Natural Resource Conservation Commission, TNRCC. Did you work for TNRCC at one time?

A. I did.

Q. And did essentially the agency transform from the Water Development Board and the Water Commission and the Texas Department of Water Resources sort of being somewhat together, into TNRCC and then into TCEQ?

A. That's correct.

Q. So every so often, the agency kind of comes back as a little bit different named entity?

A. Seems to work that way.

Q. Any plans to change the name any time soon?

A. Not my recommendation.

Q. And with regard to this permit to appropriate, I'm just going to point you to essentially the, a similar provision on

this permit, and, and it asks -- do you, is it your understanding you have authority to enforce these permits?
A. Yes.
Q. And this last line here says, "This permit is issued subject to the rules of the Texas Natural Resource Conservation Commission, and to the right of continuing supervision of state water resources exercised by the commission." Do you see that?
A. Yes, I do.
Q. And is that standard language in all these permits?
A. It's, I wouldn't say it's in every permit, but it looks like standard language that I've seen before.
Q. And again, do you know if you have the authority to enforce this or not?
A. I believe we do.
Q. Would that be different from a, the certificate of adjudication, or would it be similar? Do you know of any difference?
A. I don't know of any difference between the two in the way we would go about enforcing it.
Q. But you do agree that essentially the water rights that are out there will either be certificates of adjudication or issued permits?
A. That's my understanding.
Q. Now, I was about to ask you a bit about watering lawns and the use of water by a municipality. Once the TCEQ issues a

permit, or once the State has issued a water use permit, do you have authority over how the water is used within that community that has a permit?

A. The permit would -- I mean, if it's a municipal use --

Q. That --

A. -- that would have a definition. I mean, it would need to be used in that way.

Q. But as long as it's within the broad definition of municipal use, to your mind does the TCEQ have authority to say, within various categories that are allowed under that permit, certain things can or cannot happen, based on your continuing supervision?

A. Right. You would have to comply with whatever permit and whatever condition was in that permit.

Q. But if it were not written into the permit, could you, as an agency, impose additional conditions?

A. I'm not aware that we could do that.

Q. To your knowledge, have you ever done that?

A. I'm not aware that we've imposed additional conditions on a permit that wasn't in there, that was issued by the Commission.

Q. And I'll represent to you, none of these are trick questions.

A. Okay.

Q. I'm just trying to understand what your understanding is.

I'm not going to pull something up and try to catch you on something.

A. Understood.

Q. Now --

THE COURT: He doesn't have any rabbits he's going to say, "Oh, but you did this one."

MR. BLACKBURN: I just want to let you --

THE WITNESS: I'm waiting for that.

BY MR. BLACKBURN:

Q. Well, I know you're waiting for that, and I'm just trying to --

A. Right.

Q. -- you know, basically more generally just try to establish your understandings and kind of to give us some of the background and some of the base about how, at least in a broad, general sense, operations are perceived. And like I said, I'm not going to be pulling something out and throwing it down and "Aha," although it would be fun.

Now, with regard to industrial withdrawals, to your knowledge, has TCEQ ever asked the industries to look through their processes and try to reduce the amount of water that they use through various, for example, industrial recycling operations, things like that?

A. I think certainly we would encourage them to do that.

Q. Well, I understand you might pick up the --

THE COURT: The question was have you ever done it.

THE WITNESS: Oh, has the agency ever --

BY MR. BLACKBURN:

Q. Yes.

A. -- ever done that? I think we have.

Q. It doesn't offend your sense of fairness that the agency might actually compel something like that?

A. No.

Q. Now, with regard to water that's returned to the river, do you have any understanding about whether or not a person who has diverted water, sends it into a waste water plant, can put a pipe at the end of the waste water plant and then continue to use the water?

A. In a direct reuse manner? Yes.

Q. That's what I call direct reuse.

A. Right.

THE COURT: Hold up just a second.

(Court and Clerk conferring off the record.)

THE COURT: Go ahead.

THE WITNESS: Yes, I'm aware that that is an option that's available to them, unless they have another provision in their permit that would say they couldn't do that.

BY MR. BLACKBURN:

Q. Do you know if it's routine to require return flows as a condition of permits?

A. I don't know that I would say that it was routine. I'm aware that some permits do require that.
Q. And would you agree with me that most of the older permits do not have a return flow requirement?
A. I'm not aware that -- I don't think I know. I mean, I know a lot of permit -- or there's a lot of permits out there that do not have those requirements to return effluent back into the stream.
Q. Are you familiar with the oath of office that is utilized by the TCEQ for the Commissioners?
A. Vaguely.
Q. Do you --
THE COURT: Pardon?
THE WITNESS: Vaguely.
BY MR. BLACKBURN:
Q. Do you agree that --
THE COURT: That's, that's a trick question.
THE WITNESS: Yeah.
MR. BLACKBURN: It's a trick answer.
BY MR. BLACKBURN:
Q. I'm going to show you what has been marked as Plaintiff's Exhibit 172, and just ask you if you have ever seen the State of Texas Oath of Office.
A. I do.
Q. Have you ever seen it before?

A. Yes, I've seen it before.
Q. And do you, would you just -- would you agree with me that the Commissioners sign an oath that to the best of their ability --
THE COURT: I can read all that.
MR. BLACKBURN: Okay.
BY MR. BLACKBURN:
Q. Have you ever had a discussion with a Commissioner about what it means to comply with federal law?
MR. WILLIS: Your Honor, I do want to at least urge a cautionary note --
THE COURT: Yes.
MR. WILLIS: -- regarding --
THE COURT: Any privilege matter?
MR. WILLIS: -- any attorney-client --
THE COURT: Do you want to confer with him before he answers that?
MR. WILLIS: No, I think this has been discussed, but I think he understands that anything with the Executive Director and the Commissioners that were, or individual commissioners or the Commission under any attorney-client relationship, that he certainly is, needs to speak up and say, "I can't discuss that based on attorney-client."
THE COURT: What's the attorney-client? Are they attorneys or --

MR. WILLIS: When they, when the Executive Director is discussing with a particular Commissioner and Counsel for the agency, as I understand --

THE COURT: And Counsel.

MR. WILLIS: Yes.

THE COURT: Okay. I'm just saying if they have individual --

MR. WILLIS: No, no, not directly with them. But I'm saying excluding, you know --

THE COURT: Do you understand the difference?

THE WITNESS: I think I need to have him rephrase or ask the question again.

THE COURT: You can only answer the type of questions that are asked you that have to do with individual questions or conversations you've had with Commissioners or the Commission which were not, with the lawyer not present.

MR. WILLIS: Yes.

THE COURT: Okay.

MR. BLACKBURN: And I agree, certainly.

THE COURT: Is that right? Have you got that, those parameters?

THE WITNESS: Yes, Your Honor.

MR. BLACKBURN: Right. And I certainly --

THE COURT: Okay. If you have any question at all, your lawyer's right there, and you can ask him. We can stop

the proceedings and you may consult with him.

THE WITNESS: Yes, ma'am.

THE COURT: Okay. So don't worry about it.

BY MR. BLACKBURN:

Q. And I'm not trying to get into your attorney discussions, so --

A. Could you ask the question again, please?

Q. I think what I asked was whether you had had discussions with Commissioners, with any Commissioner about what it means, under this oath, to comply with federal law.

A. I don't think I've had discussions with the Commissioners that would connect their oath and how we complied with federal law.

Q. Thank you.

MR. WAITES: Your Honor, I'm just going to flash something up to test real quickly.

THE COURT: Thank you. Got it.

MR. WAITES: Thank you. Thank you, sir.

THE COURT: Thank you.

MR. BLACKBURN: And thank you, Your Honor.

BY MR. BLACKBURN:

Q. Now, with regard to your administration of water permits, have you ever had occasion to use emergency powers?

A. I'm not sure what you mean by "emergency powers."

THE COURT: Well, I think you ought to tell us if

there are any such things.

THE WITNESS: I mean, we have, we have emergencies, and so, and we have addressed conditions when there are emergencies, and whether that --

THE COURT: But you wouldn't call them emergency powers, separate and apart from the regular things that you would do?

THE WITNESS: That's correct.

THE COURT: You might speed it up in an emergency?

THE WITNESS: Right. Absolutely.

THE COURT: Okay. So would you agree with that? That's kind of a misnomer, "emergency powers"?

MR. WILLIS: I'm not sure where Mr. Blackburn's going there, or particular uses of the terms in certain statutes, I think. So you know, it's one thing if he's trying to interpret a statute. It's another if he just says in an emergency situation if you go about thinking differently.

THE COURT: So would you prefer him to qualify these questions by saying, "I'm referring to emergency, this statute such-and-such."

MR. WILLIS: I'm assuming that he was about to do that. I guess, Jim, is you were about to go into that statute?

THE COURT: I don't think so.

MR. BLACKBURN: I actually was -- I was actually asking a more general question and just —

THE COURT: I think so. I don't think it was --

MR. WILLIS: General's fine. I mean, I think he understands that. As long as he's not -- excuse me, Your Honor -- being questioned about the specific statute without knowing what it was.

BY MR. BLACKBURN:

Q. I'm not referring to any specific statute, but I'm just simply trying to get more of a general idea about how you, as the Executive Director, perceive your authority over sort of the permits, over water withdrawals and things like that.

And I'm just asking generally, does the term "emergency powers" enter into your understanding of your authorities under essentially the water rights program in a broad, general sense?

A. Well, I mean, there are, I mean, in fact I think there were some legislative changes this past session that spoke to emergency conditions and defining emergency conditions, and we're in the process of going through a rule making to do that right now.

Q. So this last legislative session may have broadened the authority, perhaps broadened the authority that the TCEQ had with regard to drought conditions?

A. I'm not sure I would say it broadened it. It certainly made it more specific as to what we could do under those conditions.

Q. Now, under any type of power authority, emergency power or

any of your supervisory authority or anything like that, are you aware of the TCEQ ever directing any of its power and attention to whooping cranes?

A. Yes, I am.

Q. In what case?

A. We -- well, first of all, any time we would issue a permit, we would go through an evaluation of instream flows, fresh water instream flows into the bays and estuaries and make an assessment of that in our review of the application.

The other one that comes to mind is -- and, well, I'll back up and say it didn't relate directly to the whooping crane, but it related to the wetlands and the bays and estuaries, and that was an enforcement case where we had a supplemental environmental project that was designed to direct money to enhance Aransas, the Aransas Wildlife Refuge.

THE COURT: When was that?

THE WITNESS: It was in, I believe, Your Honor, 2006.

MR. MUNDY: Thank you.

BY MR. BLACKBURN:

Q. And with regard to existing permits, the ones that, say, were issued decades ago, when those permits were issued, do you have any knowledge about whether any type of impacts to the whooping crane or bays and estuaries were considered in any extent?

A. I'm not aware.

Q. You're not aware --
A. I'm not aware that those conditions or that evaluation was made in those older permits.
Q. Now, do you agree that TCEQ has the power and authority to cancel water permits for nonuse?
A. I believe we have that authority, yes.
Q. And have you ever used any of your cancellation powers in any way to help or assist getting environmental flows to the whooping cranes?
A. I'm not aware that we've done cancellations to enhance or to get water to the whooping cranes.
Q. To your knowledge, has TCEQ given any instructions to its employee, the employees, water users under permits, exempt water users or any other persons with the purpose of protecting the whooping crane?
A. To the extent, again, that our permits contained provisions to ensure instream flows and we enforce those permits, I mean, I think we are.
Q. Right. Now, "instream flows" is a term you've used a couple of times. Could you tell us what you mean by "instream flows"?
A. It's just, again, when you're processing or, my understanding, when you're processing a permit application, that there would be an evaluation made related to ensuring that there was fresh water flowing into the bays and estuaries.

Q. Now --

MR. BLACKBURN: Would you pull up Plaintiff's Exhibit 11, please.

BY MR. BLACKBURN:

Q. Now, this is a document that we've talked about a bit in this trial so far. This is Plaintiff's Exhibit 11, the International Recovery Plan of the Whooping Crane. And I'll ask you, have you had a chance to review this document?

A. I have not reviewed it, aside from the deposition when you asked me to read from it.

Q. But you, you have at least seen the cover.

A. Yes.

Q. And would you go to the second page, I believe. And I think that we discussed whenever I took your deposition as to whether you knew that it had been signed by the Executive Director of Texas Parks and Wildlife. And I guess you knew it after the deposition. And my question is, does it, does it mean anything to you at the TCEQ that Texas Parks and Wildlife has signed the Recovery Plan?

A. I mean, I acknowledge that they produced this plan and it's out there.

Q. Have --

THE COURT: What's the number again?

MR. BLACKBURN: Plaintiff's Exhibit 11.

BY MR. BLACKBURN:

Q. And I guess my question is more generally, is there something like State policy where one State agency is sort of obligated to comply with or bound by the obligations imposed, or kind of concurrence indicated by signing of another agency?
A. I'm not aware that we're bound to follow a report or, generated by another agency.
Q. And you meet with the heads of other agencies and things like that, and you just, you don't meet and say, "Okay, Parks and Wildlife, you did this, so we will implement it over here," and things like that?
A. You're correct in that I do meet with my counterparts at Parks and Wildlife and the Water Development Board, and we have general discussions, but yeah, they don't come to me and say, "Here's our report and you have to go do this."
Q. Now, does the TCE -- or does the TCEQ honor, if you will, the documents that were prepared and analyzed by predecessor agencies?
A. I mean, I think certainly we would acknowledge they exist and review them and take them into consideration, but obviously over time new data becomes available, new technologies become available and data changes and we have more data, so that data is there, and I would expect that we would at least review it.
MR. BLACKBURN: And would you turn to Page 21 of the document, please.
MR. WAITES: Did you want --

MR. BLACKBURN: And come in on the, I think it's the last paragraph, if I'm not mistaken, before the break.

BY MR. BLACKBURN:

Q. Now, do you see that by coming down to the last sentence, I believe, by 2040, due to constructive diversions, a decrease of fresh water inflows into the crane's winter range is projected in an average year to cause an 8 percent decline in blue crab populations. Do you see that?

A. Yes, I do.

Q. And the citation for that is Texas Department of Water Resources, 1980. Do you see that?

A. Yes.

Q. And is the Texas Department of Water Resources a predecessor agency to the TCEQ?

A. Yes.

Q. Now, to the best of your knowledge, has TCEQ conducted its own independent analysis of the impact of fresh water inflows on blue crab populations, associated with whooping crane mortality?

A. I don't think that we've done a specific report, but again, as we would conduct our reviews of any permit application and review again those instream flows to ensure that there was instream flows that would cause, or to make sure that the bays and estuaries were viable and they were a good environment, we would conduct a review in that manner.

Q. But you're --
A. And, but it would --
Q. Well, I'm sorry.
A. I'm sorry. It would be the overall environment of the bay and estuary, not specifically related to blue crabs and whooping cranes. It would be related to all the species that use the bays and estuaries.
Q. But as I understand it, it would be in association with the review of a new proposed permit? Is that correct?
A. That's correct.
Q. And what about the old permits that are out there? Have you conducted, TCEQ, any independent analysis of the impacts of the current suite of withdrawals that are in existence on salinity, blue crabs, whooping cranes, in San Antonio Bay system?
A. Well, and I'm not an expert on everything that goes into the evaluation of a new permit, but I believe that they would consider the old permits in their evaluation of the availability of water, as it pertained to the request in the new permit.
Q. That's not really quite my question.
A. Okay.
Q. Without a new permit, would there, is there, has there been any independent evaluation by TCEQ?
A. I'm not aware that we've done that.

Q. Now, would you agree with me that TCEQ does have discretion to make exceptions in both enforcement and implementation of terms and conditions of water rights?
A. Under certain conditions we've made exceptions.
Q. And is it true on the Guadalupe River system that you made an exception for the City of Kerrville, for example?
A. I believe that we accommodated a request for the City in order for them to withdraw water to supply it to their citizens to ensure that the public's health was protected.
Q. And this was during the 2008-2009 time period. Correct?
A. We did make that accommodation in 2008 and 2009.
Q. And that was essentially a situation where a junior water right essentially should have been cut off, and you chose not to cause that cut off. Correct?
A. That junior water right was a municipal water right that was the City of Kerrville's, and we did not request them, or we did not direct them to cease all of their water withdrawals, but we did ask that they take less, so they --
Q. Try real hard?
A. Try real hard, implement their drought contingency plan and take less water than they were authorized to, but not stop all of their water withdrawals.
Q. With regard to the fracking activity associated with oil and gas activity, has TCEQ issued temporary permits allowing the use of water for fracking?

A. It's --

THE COURT: Use of water for what?

MR. BLACKBURN: For fracking.

THE COURT: Okay. I know what that is.

THE WITNESS: I'm aware that we've issued -- I believe that we've issued temporary permits for oil and gas exploration and production, and I'm going to assume it was for fracking.

BY MR. BLACKBURN:

Q. And has the TCEQ subsequently withdrawn such temporary permits after complaints?

A. Not so much -- the answer is yes. We have withdrawn temporary permits in response to senior calls for water.

THE COURT: So those were complaints, I guess?

THE WITNESS: They weren't really complaints, Your Honor.

THE COURT: There wasn't enough water?

THE WITNESS: Yeah. The senior water right holder asked for water, and in order for us to get them water, we cut off those temporary water rights.

THE COURT: So it was due to priorities.

THE WITNESS: Correct.

THE COURT: Okay.

MR. BLACKBURN: Mr. Vickery, I thank you for willingly appearing, and I'm sure we'll talk with each other

again.

THE COURT: Break time, or do you want to start?

MR. WILLIS: Your Honor, I probably only have an hour-and-a-half -- no, I'm just teasing. I don't think I'm going to have very much at all, if you want to go ahead and let me finish up.

THE COURT: You tell me how you want to do.

MR. WILLIS: I'd just as soon go forward.

THE COURT: Go ahead.

CROSS-EXAMINATION

BY MR. WILLIS:

Q. Mr. Vickery, you spoke, or you explained a little bit about the role of the Executive Director. How big of an agency is the Commission on Environmental Quality?

A. We have over 2700 employees.

Q. And you're responsible for all of those employees?

A. Yes, sir.

Q. And you talked about the different divisions, Air, Waste and Water. You're responsible for each of those divisions as well?

A. Yes.

Q. Now, would it be fair for me to say then you're not the expert in the agency on water permitting?

A. That would be more than fair.

Q. Perfect. Then I'm going to ask you some questions on

water permitting.

THE COURT: Did he say who? Or --

MR. WILLIS: I'm sorry?

THE COURT: He said he would be an expert on what?

MR. WILLIS: He said he would not be, and I was just teasing.

THE COURT: Not me, okay.

MR. WILLIS: I was only going to ask him just a few general questions.

THE COURT: That's what I thought. Sorry.

MR. WILLIS: That's all right. My joke didn't go very well.

THE COURT: I appreciate it.

BY MR. WILLIS:

Q. One of the permits, in fact not the certificate of adjudication you were shown --

MR. WILLIS: What was the permit number? The exhibit that you showed him?

MR. BLACKBURN: 379?

(Counsel conferring off the record.)

MR. WILLIS: That's it. Thank you. Could I get the ELMO, please?

BY MR. WILLIS:

Q. Let's go back and look just briefly at this permit. Do you recognize this as the permit you were shown?

A. Yes, I do.
Q. Okay. Now, if you would look, if I can find it in here, go to the last page under Subsection B, if I can move it back in a little. You see where it says, "The permit shall expire and become null and void on December 31st, 2012, with no further Commission action," unless prior to that date they apply for essentially a renewal of the permit, an extension of it? You see that?
A. I do.
Q. That's what's called a term permit. Correct?
A. Correct.
Q. And you do at least understand, even though you're not an expert on permits, that temporary permits like the one that you were discussing about oil and gas operation and term permits like the one you were shown, that those are usually the first ones in times of water shortages or drought that the Commission will suspend?
A. That's correct.
Q. And yet even when those permits are issued, when application process, when an entity applies for such a permit, that's one of the things the Commission looks at on water availability and one of the tools that they use is considering both either a temporary permit or a term permit. Correct?
A. That's right.
Q. You know, both in your deposition and today, you were

shown the International Recovery Plan, and it was signed by, I believe, U.S. Fish and Wildlife and Texas Parks and Wildlife. You've had discussions, you said, with your counterpart, Texas Parks and Wildlife, on a regular basis, I assume?

A. I do.

Q. Has anyone with the Texas Parks and Wildlife, or has anyone with the U.S. Fish and Game Department, ever contacted you, the Executive Director of TCEQ, and said, "Y'all have got to do something different on the way you're managing this water that's going into the bays and estuaries"?

A. I haven't had that kind of conversation.

THE COURT: So what happens with these plans? Do they just get published and that's it? And nobody acts on them?

MR. WILLIS: I will -- I hate to, hesitate to say I'll let Mr. Blackburn testify to that.

THE COURT: You know, that's a bad -- that's a bad thing to say to you. Sorry.

MR. WILLIS: Well, I'm not the one that's going to address that. I think maybe a witness or two may address it. But what's just as important is how it, how they -- whether or not they, whether or not they are applied to, I shouldn't say applied, is what the purpose of those plans are --

THE COURT: Okay.

MR. WILLIS: -- in day-to-day operations of TCEQ.

Because the fact is that they're being sued on mismanagement of the way they handle water rights, and yet they are following the strict letter of the law on what they're required to do. And again these other agencies, even Mr. Blackburn points out, there is no requirement regarding -- I'm stepping into an area I really didn't want to step into, but there's no --

THE COURT: Then don't do it, if you're uncomfortable.

MR. WILLIS: There's no requirement regarding the interaction between something that the Texas Parks and Wildlife might sign off on. And the fact that they're citing something from 1980 in there, in some law that says that the Texas Commission on Environmental Quality must immediately, I guess follow this plan, whenever -- but I would like to address, even though he's not the one --

THE COURT: So that would be kind of a legislative function? I mean, it would report to the -- I guess that's all a part of the executive branch.

MR. WILLIS: My understanding.

THE COURT: So the executive branch would take the plan and say what? Propose legislation or --

MR. WILLIS: Well, Your Honor, I think if we get into, with the witness into the Senate Bill 3 process, I think that that's probably one of the better routes of discussing both the science that's out there and how it is applied

through, as you said, the legislative process. Would that be okay?

THE COURT: However you want to do it. I just want to know at some point.

BY MR. WILLIS:

Q. I would, I'd like to also ask you, Mr. Vickery, now, you talked about the fact that whether or not such plans as this or any science whether or not it's considered by the agency, but in fact you pointed out that, again, not being an expert in permitting, but it's your understanding that the water permitting section in fact considers the science whenever, on applications for new permits?

A. That's correct.

Q. And you pointed out new permits. The same thing is considered on any applications on amendments to existing permits. Correct?

A. That's correct.

Q. As Executive Director for TCEQ --

THE COURT: I just want to remind everybody, when you rattle your papers in front of the microphone --

MR. WILLIS: Sorry.

THE COURT: -- it interferes with the quality of the recording.

MR. WILLIS: I apologize.

THE COURT: Thank you all.

BY MR. WILLIS:

Q. Before this lawsuit was filed, before The Aransas Project brought this lawsuit against TCEQ, you were given knowledge of the fact that The Aransas Project felt like that TCEQ could do more to help the organization in regards to the whooping cranes. Correct?

A. Yes.

Q. And in fact, you had ideas and discussed ideas in ways of possibly different things that might help to consider maybe you don't know if it would completely alleviate the problem but might help toward alleviating problems.

A. We did.

Q. You mentioned briefly a supplemental environmental project, I believe. Could you tell, again tell the Court what a supplemental environment -- supplemental environmental project is?

A. Your Honor, the -- I can't remember the exact time frame for when we started those, but it's a process or an opportunity to take penalty dollars, if we have an enforcement respondent that is assessed a penalty for a violation, to defer or to take a portion of those penalty dollars and apply it to an environmental enhancement project. And we've been real successful in doing that.

THE COURT: You've been doing that with the one that I sort of --

THE WITNESS: Yes. Yes, Your Honor.

THE COURT: The air monitoring system, and you're applying a lot of those fines --

THE WITNESS: Yes, we --

THE COURT: -- or penalties --

THE WITNESS: Right.

THE COURT: -- to that fund. And it's been very helpful.

THE WITNESS: It has. And we don't -- we do it across the board in all of our programs, whether they be Air, Water and Waste. And it's a way to fund projects without, I mean, the agency may not have funding, and you can, you're able to leverage your resources that way.

BY MR. WILLIS:

Q. Again, is that what you see as another opportunity or another indication of ways that the Commission on Environmental Quality can assist in problems such as one of the ones that the Court's trying to address here, without interfering with property rights of individual water right holders?

A. Absolutely.

MR. WILLIS: I'm going to pass the witness, Your Honor.

THE COURT: Thank you, sir.

MR. WILLIS: Sorry about the paper rattling.

THE COURT: It wasn't you. You were just standing

there when I said it.

MR. BLACKBURN: Could you -- could I have just a second, Your Honor?

THE COURT: Yes, sir.

(PAUSE.)

MR. BLACKBURN: No further questions, Your Honor.

THE COURT: Thank you very much, sir. You're excused. Now, the witness -- I mean a break, right?

MR. BLACKBURN: Right, a break.

THE COURT: A break.

MR. BLACKBURN: That's why I didn't ask any questions.

THE COURT: Yes, clever man.

(Recess from 3:10 p.m. to 3:28 p.m.)

THE COURT: Thank you. You may be seated. Next witness?

MR. BLACKBURN: I'd like to call Larry Soward, please.

LARRY SOWARD, PLAINTIFF'S WITNESS NO. 14, SWORN

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Would you introduce yourself to the Judge, please?

A. Your Honor, I'm Larry Soward. The last name is spelled S-O-W-A-R-D.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q. And Mr. Soward, where do you live?

A. I live in Austin and Houston, Texas.

Q. So you're bi-city, huh?

A. I'm bi-city.

THE COURT: He's not a rich lawyer from Houston?

MR. BLACKBURN: No, he's a former State employee.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. I guess the question, what is your current employment?

A. Well, I am predominantly retired as a public servant of the State of Texas, but I'm doing some independent consulting work, predominantly in the Houston area.

Q. Now, I believe you've provided us with a resumé, which is Exhibit 261, and I think that it's been admitted. And I just ask you, to the best of your knowledge, is what you gave us a true and correct copy of your resumé?

A. It is.

Q. And I'm just going to ask you a series of questions about your resumé, rather than reading through it, but I'd like to ask you a bit first about your educational background.

A. I have a bachelor's degree with a major in mathematics from the University of Texas in Austin, and I have a law degree from the University of Texas School of Law.

Q. And you have described yourself as a public servant of the

State of Texas. When did you start your public service?
A. August 25th, 1975.
Q. You know it down to the day?
A. Yes, sir. It was on a Monday.
Q. What did you do to start this public career?
A. I started with what was then known as the Texas Water Quality Board. It was the agency of the State at that time charged with regulating water quality issues in the State, as well as industrial solid waste.
Q. And was that the first environmental agency of the State of Texas?
A. The first? No, sir. It had predecessors. I dare to say that I know exactly the first, but a predecessor to that agency even was called the Texas Board of Water Engineers.
Q. And, but certainly the type of industrial waste and water quality issues that have subsequently come to be regulated didn't really happen until the '70s. Right?
A. I believe the Water Quality Board was created in 1967.
Q. And what did you do at the Water Quality Board?
A. Well, my first position at the Water Quality Board was what was known as a Hearings Examiner, which today we call them Administrative Law Judges. But I was a Hearing Examiner who heard permitting and enforcement cases dealing with water quality issues.
Q. And for how long did you stay in that position?

A. I was in that position from August of 1975, as I indicated, until I believe it was 1978.
Q. And then what happened?
A. I was named Assistant Chief Hearings Examiner for the Water Quality and Solid Waste programs.
Q. And you stayed there for a period of time?
A. I stayed there until 1983, in which I was named then the Chief Hearings Examiner of the Texas Water Commission.
Q. So new group, Water Commission.
A. Yes. What happened is in 1977, the legislature did a reorganization of the water agencies. And before 1977, there were three water agencies. There was a Texas Water Quality Board, the Texas Water Development Board, and the Texas Water Rights Commission. In 1977 the legislature reorganized all of those and created what they named the Texas Department of Water Resources.

And they basically set up a pattern in the agency similar to government. They created a legislative, a judicial and executive body. The Texas Water Development Board was made the legislative body of the Department of Water Resources. The executive staff, the executive administrator was made the executive part of the agency, and the old Texas Water Rights Commission was made the judicial function of the Department of Water Resources. And it was named the Texas Water Commission.

It actually in statute was designated as an independent

agency within an agency, and it was headed by the three Water Commissioners, and I was their Chief Hearings Examiner, as I said, starting in '83.

Q. So how long did you keep in that role?

A. Kept that role until September 1, 1985. Then I became the Executive Director of the Texas Water Commission. The legislature had done another reorganization of the agencies in 1985. And just as they had put all three agencies together in 1977, they split them apart in 1985 and left in place the Texas Water -- Texas Water Development Board, which was basically the planning and funding function for water management in Texas, and moved all of the permitting and enforcement and regulatory functions into the Texas Water Commission, which I became the Executive Director.

Q. And how long were you ED of the Water Commission?

A. From September 1, 1985, until the end of December 1987.

Q. And then what happened?

A. Then I had a wild hair and went out in the private practice of law.

Q. And how did that work?

A. Not very satisfactorily. I didn't enjoy it.

Q. So when did that situation change?

A. I decided to return to public service in November of 1990.

Q. And what did you return to public sector work as?

A. I became the Deputy Executive Director of the Public

Utility Commission of Texas.

Q. And how long did you stay there?

THE COURT: The what? Public --

THE WITNESS: Public Utility Commission.

BY MR. BLACKBURN:

Q. And then what did you do?

A. I stayed there from November 1990 until November 1992.

Q. And where did you go?

A. In November of 1992, I was named Special Counsel for Water by the then, by the then Commissioner of Agriculture.

Q. And how long were you Special Counsel for Water with the Texas Department of Agriculture?

A. From November 1990 until about sometime in '93. '92-'93.

Q. So you said 1990. Did you --

THE COURT: I'm sorry, there's something wrong with those dates.

BY MR. BLACKBURN:

Q. Yes.

A. I'm sorry.

Q. You said 19 --

A. I meant -- I'm sorry.

THE COURT: I got, I got that you were the Director of the Public Utilities Commission from '90 to '92.

THE WITNESS: Correct. So I was the Special Counsel for Water, Department of Agriculture, from November of '92

until about 1994.
BY MR. BLACKBURN:
Q. So about two years.
A. About two years as Special Counsel.
Q. And then what?
A. I was named Assistant Commissioner of the Department of Agriculture.
Q. And how long did you stay there?
A. About two years.
Q. So we're up to about 1996?
A. Correct.
Q. Then what?
A. Then I was named the Deputy Commissioner of the Department of Agriculture.
Q. Until?
A. Until the end of 1998.
Q. And next?
A. Then I became the Chief Clerk and Deputy Land Commissioner of the Land Commission on January the 1st or 2nd, I forget what working day it was, of 1999.
Q. And how long did you stay there?
A. Stayed there until late December 2002.
Q. And where did you go then?
A. Then I became the Executive Assistant to the Lieutenant Governor of Texas.

THE COURT: What year?

THE WITNESS: January of 1999.

BY MR. BLACKBURN:

Q. I'm sorry, I thought you were Chief Clerk of GLO from '99 to 2002.

A. All right, let me back up.

THE COURT: This is awful, isn't it?

THE WITNESS: It is. I'm too old to remember those dates, Your Honor.

The Lieutenant Governor was, I mean, the Land Commissioner was elected in 1998, so he took office in 1999. So I became the Chief Clerk and Deputy Land Commissioner then in January of 1999. He served his four years, so I was Deputy Land Commissioner until the last day of December 2002.

BY MR. BLACKBURN:

Q. Then you went to work with the, as the Executive Assistant to the Lieutenant Governor?

A. Correct, in January 2003.

Q. And how long there?

A. I stayed there until the end of August of 2003.

THE COURT: Who was the Lieutenant Governor then?

THE WITNESS: David Dewhurst.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. And then what happened after August of 2003?

A. I retired for seven weeks.
Q. A glorious seven weeks?
A. Actually, it was. I toured Europe.
Q. And then what did you do?
A. Then I was appointed to the Texas Commission on Environmental Quality as a Commissioner by the Governor of the State of Texas.
Q. So you are a former Commissioner of the TCEQ?
A. I am.
THE COURT: And what year was that?
THE WITNESS: I was appointed in October 2003 and served until August 31st, 2009.
THE COURT: Thank you.
BY MR. BLACKBURN:
Q. Now, over your years of public service, it appears that you have on many occasions had experience with water rights.
A. Correct.
Q. Could you describe as, particularly as Chief Hearings Examiner, your time with both TDWR and, or I'm sorry, with TWC over that period in the '80s that you were working. What did you do with regard to water rights?
A. Well, as part of my duties and responsibilities as the Chief Hearings Examiner of the Water Commission, I was over all of the Hearings Examiners in the office, which was basically divided into two components. We had Hearings Examiners that

heard nothing but water quality and solid waste cases, and we had Hearings Examiners that heard nothing but water rights permitting and water rights adjudication cases.

And as Chief Hearings Examiner, I was over all of those attorneys, all of those Hearings Examiners, in a supervisory and administrative capacity.

Q. Well, please tell me you knew something about the law of water rights in the State of Texas.

A. Well, I had to, because I supervised all of those attorneys and their work, and I signed off on all of their recommendations and proposals that then went to the Water Commissioners.

Q. So in terms of needing to know about the law of water rights in the State of Texas, what exactly was accomplished in these hearings? I mean, why would a hearing be held?

A. Well, in the water rights permitting field, let's take that first. In the water rights permitting field, an applicant that sought to use State water would apply for a permit. And after that was processed, the application was processed by the technical staff of the agency, in those days it was required to go to a public hearing, in which the applicant was required to prove up their case, if you will. They had to prove that they were going to use the water for beneficial purposes, that there was water available, and that no existing water rights would be impaired.

And then in that, I want to call it a contested case process. It wasn't often contested. Many times it was unopposed. But in that process, then a record would be built in which the hearings examiner would then make a recommendation to the Water Commissioners whether or not to grant or deny that permit. And if to grant it, whether or not there should be any special conditions placed in that permit.

On the adjudication side, it was somewhat different. We were in the process of implementing the Adjudication Act of 1967. We were kind of on the tail end of that process in the '80s, but the Hearings Examiners that were doing the adjudication were taking all of the filings that had been required under the Adjudication Act, the certified filings and the permits that had existed prior to the Adjudication Act, and holding hearings to determine whether or not those water rights filings were supported by historical records and data, so that they could then be certified under the Adjudication Act.

Q. And this is the Texas Water Rights Adjudication Act of 1967?

A. It is.

Q. And would you say that that's the cornerstone of Texas water rights today?

A. I'm not sure I know what you mean by "cornerstone," but what the Adjudication Act of '67 did was it took all existing, what was called certified filings, which represented official

filings in the County Clerk's Office in the State of Texas of riparian water uses that had been allowed prior to 1967, as well as any permits that had been issued by the Water Rights Commission or its predecessor prior to 1967, and it merged the appropriated program and the riparian program together into one and issued ultimately a certificate of adjudication.

So that you didn't, you no longer had riparian rights, except for domestic and livestock. You had no riparian rights, and all permits prior to that date were then merged into certificates of adjudication, such that after that date any new requests for water were handled through a permitting program. So that's why today you have certificates of adjudication and permits.

Q. And would all permits be after the certificates of adjudication in time?

A. Yes.

Q. And with regard to the role that you performed as Special Counsel for Water at Texas Department of Agriculture, were you also engaged in understanding evaluation of water rights?

A. To some extent. I mean obviously water is a very important issue to agricultural interests in Texas. And you know, a lot of, a lot of Texas water rights are tied up in agricultural uses. And the Commissioner of Agriculture was very interested in staying abreast of all those issues, felt like he needed some specialized expertise in that regard, and

that's why he created the position that he asked me to assume.
Q. Now, at the General Land Office of the State of Texas, did you have any role with regard to water rights?
A. Again, incidentally, because the General Land Office has, one of its major components is the coastal programs. And so there was, there was obviously a need to be aware of water rights issues as it related to the coastal zone of Texas and the Land Office's functions.

Also, the Land Office was responsible or managed all State-owned lands. And so to the extent that there were water rights associated with those State-owned lands, the General Land Office would have been the principal involved with that.
Q. Now, as a member of -- the Commissioner on the Texas Commission on Environmental Quality, did you have occasion to become involved in issues associated with water supply, water availability, water rights?
A. Yes.
Q. And could you describe just some of the types of things as Commissioner that you would be involved in?
A. Well, in the water rights field, we obviously had occasionally some water rights permits that came in, some new ones, some amendments to existing water rights. We had some very tail-end issues associated with adjudication program, because some appeals in that process lasted a long, long time. And even when I was a Commissioner, some of the final aspects

of the appeal process for adjudication came in.

We had issues associated with what's called indirect reuse permits. We had what's called bed and banks permit issues, dealing with water rights.

THE COURT: What's that?

THE WITNESS: Bed and banks.

THE COURT: What does that mean?

THE WITNESS: Your Honor, that means if, if a water rights holder has water that they are selling or providing to a third party, rather than pipe that directly to that third party, they can use the bed and banks of Texas' rivers and streams as the conduit to get that water to them.

THE COURT: Oh, just dump the water in the river and take it down with a straw down the river or something.

THE WITNESS: Yes, ma'am.

THE COURT: Okay.

THE WITNESS: But they have to have a permit to do that, because the agency has to ensure that what water is being pulled out below is all the water that person's entitled to, considering channel loss and evaporation and things like that.

We also occasionally had some water supply contract issues, but very seldom.

BY MR. BLACKBURN:

Q. Now, Mr. Soward, do you consider yourself to be an expert in Texas water rights and water policy?

A. Given 34 years in that genre of the law, yes, sir, I do.

MR. BLACKBURN: Offer Larry Soward as an expert in water rights and water policy in the State of Texas.

MS. SNAPKA: Your Honor, on behalf of Defendants, we would object to the qualification of Mr. Soward to, as a former employee of the executive branch of Government, to attempt to educate this Court on what the law is. We believe that that is uniquely within the province of the judicial branch --

THE COURT: You've got an expert that wants to do the same thing.

MS. SNAPKA: It's, no, it's different.

THE COURT: Oh.

MS. SNAPKA: It's discussing policy, implementation of policy.

THE COURT: Is he going to be talking about statutes?

MS. SNAPKA: May talk about the implementation of statutes.

THE COURT: The same from each side then. He won't be talking about policies or statutes.

MS. SNAPKA: It's about the law and how the law was applied. I believe that's the part that we're objecting to.

THE COURT: I think that's reasonable. But on the other hand, sometimes I have a hard time separating it out, so maybe you need to -- I'll make him an expert, accept him as an expert in water rights and policy, but not as a legal authority

on the interpretation of the laws. How is that?

MS. SNAPKA: I --

THE COURT: And if I'm slipping up, you stand up and tell me.

MS. SNAPKA: Either I will or Mr. Willis will.

THE COURT: Okay.

MR. BLACKBURN: And Your Honor, we're going to try very hard to kind of skirt that boundary as well. And what my one suggestion may be, there are going to be issues and concepts that we could follow up with legal briefing, because there will be matters of legal interpretation.

THE COURT: That's fine.

MS. SNAPKA: And Your Honor, that's -- we believe that's the appropriate way to do it.

MR. BLACKBURN: But it's going to be --

THE COURT: But Ms. Snapka is absolutely right. I mean, I don't need somebody to come and explain the law to me. I really do, but I'm not supposed to, so --

MR. BLACKBURN: And like I say, we're going to try to skirt that. And what I'm going to really try to do more than anything is just talk about concepts and over time how issues have developed. And I'm going to end by asking Mr. Soward about some innovative or creative responses that may be available to the Court if the Court should so choose to head a particular direction of what redressability concepts may be out

there to be taken advantage of, conceptually, and then we would follow that with legal briefing if requested.

THE COURT: Okay.

BY MR. BLACKBURN:

Q. You understand the ground rules?

A. I think so. I'm sure I'll --

THE COURT: Explain them to me.

THE WITNESS: I think I'll find out if I don't.

MR. BLACKBURN: We will try -- and again, we'll try to be attentive, Your Honor. And if anybody thinks that we're -- I mean, well, not if anybody thinks, but certainly if you think, we will head in a different direction.

THE COURT: Okay. Get started and let's see what happens.

BY MR. BLACKBURN:

Q. Okay. Under Texas law, I really want to talk about the adjudication that occurred in 1967. Can you explain what was, what was the goal of that whole process?

THE COURT: Of what?

MR. BLACKBURN: Of the Adjudication Act of 1967 --

THE COURT: Oh, okay.

MR. BLACKBURN: -- that set in motion really the, a lot of things that are in place today.

BY MR. BLACKBURN:

Q. And I'm talking about in a broad general sense, what was

implemented under that, from a policy standpoint, what was implemented under that 1967 statute?

A. Prior to 1967, Texas had a dual system of water rights. It had what was known as riparian rights, and it had, it had also what was known as appropriative rights. Appropriative rights came into play in the late 1890s. So from about 1895 until 1967, you had both riparian rights, which ran with the land, and you had appropriative rights, which were issued pursuant to a permitting function that the legislature had created.

One was judicially created, the riparian right concept. The other was legislatively created, the appropriative right concept. And from --

THE COURT: I thought riparian rights were --

THE WITNESS: They ran with the land.

MR. BLACKBURN: Common law?

THE WITNESS: That's common law.

THE COURT: That was common law. I didn't know if it was legislative. I just thought it was --

THE WITNESS: No, the riparian was not legislative.

THE COURT: Okay.

MR. BLACKBURN: You may have misspoke, but --

THE WITNESS: I may -- the riparian was judicially created.

THE COURT: I probably misunderstood.

THE WITNESS: Common law.
BY MR. BLACKBURN:
Q. So riparian comes out of common law, sort of judicially enforced functions?
A. Yes.
Q. And the permitting system was under the legislative concept?
A. Correct, the appropriative right under the permits.
Q. And --
A. So --
Q. In '67, what happened?
A. So from 1895 approximately until 1967, you had these dual authorities. And needless to say, there was some confusion in the communities of, whether they're the water rights users or the people charged with enforcing the water rights, at any given time, you know, which rights were which, because you often had riparian rights and appropriative rights in the same stream segment.

So the legislature, in its wisdom, decided to merge those two functions, those two areas of water rights together. So in the Adjudication Act of 1967, they merged all the riparian rights with the appropriative rights, to end up with one system, and that was an appropriation system, except for domestic and livestock uses.
Q. Now, can you describe how domestic and livestock is

treated differently? I think we've talked about it a little bit. You've heard much of those discussions. Have those discussions been generally right?

A. Yes. I think the Water Master was the most correct in his testimony. Domestic and livestock uses are exempt from any permitting by the State of Texas, by statute, and, as long as they meet the definition of domestic and livestock. They are senior to any other water right in the state. So if you take the most senior permitted right, or certificate of adjudication in a river segment, a domestic and livestock use anywhere on that river is superior to that water right.

So that's how they're different. They're superior to every other water right, and they're exempt from any permitting or monitoring.

Q. So to your knowledge, there's really not a database out there about these?

A. To my knowledge, there's not.

Q. Now, with regard to, again, I use the rich Houston lawyer analogy, going and buying a piece of property on a river somewhere. If I buy a piece of property that's on a river that has frontage, do I acquire with that property this domestic and livestock exemption?

A. You do if you qualify, based on your uses of that water.

Q. And there was prior testimony that if you used it for commercial purposes, even to the point of selling peaches on

the roadside, you might lose it. Do you concur with that?
A. Yes. I think the only exception the TCEQ allows is you can sell your products in a bake sale or a pot luck supper.
Q. So we've gotten down to that level of detail, huh?
A. Yeah, their rules actually, or their documents and guidelines actually say that you can sell in a bake sale or a pot luck supper.
THE COURT: Thank goodness for the legislature. Right?
THE WITNESS: Well, that's actually the TCEQ's rules.
THE COURT: Oh, good.
MR. BLACKBURN: But did you --
THE WITNESS: But you cannot --
BY MR. BLACKBURN:
Q. Did you -- are you responsible for passing the bake sale exclusion?
A. No, sir. But you can't use the water to produce anything for commercial purposes.
Q. Now, with regard to -- so basically, when I bought that, when I buy that piece of property, I kind of move to the top of the line as a riparian owner?
A. You're at the top of the, top of the line. You and all the other domestic and livestock users in the basin.
Q. Now --
THE COURT: Is that a, I forget now, is that a

constitutional right?

THE WITNESS: It's statutory, Your Honor.

MR. WILLIS: Which right would that be?

THE COURT: Statutory. Riparian rights are statutory?

MR. WILLIS: Well, since it's based on the statutory riparian rights, yeah.

THE COURT: Okay.

THE WITNESS: It's statutory.

BY MR. BLACKBURN:

Q. Now, there's all of these existing permits. I don't own property next to a river, or if I do, I want to use water for commercial purposes, and I want to go and put my straw in the river. How does that process work?

A. To do that, you have to apply for a water rights permit from the Texas Commission on Environmental Quality and have the Commission approve that permit and issue it.

Q. So I would file an application, deal with a lot of the folks that are over here on the not-smiling side of the room, and they would process it, send it through their internal processes, whatever they may be, perhaps go up to a Hearing Examiner, and then ultimately come to the Commissioners for approval?

A. Correct.

Q. And in that process of sort of the appropriation of new

water, what are the types of policies that apply to those new appropriations?

A. Well, they -- your use of the word "policy" caught me. But let me say, to get that permit, there has to be a demonstration satisfactory to the Commissioners that there is unappropriated water available in the stream in an amount to cover the request, that your requested use of that water will be put to a beneficial use, that existing water rights in the basin will not be impaired if your permit is granted.

Q. So there's a set of sort of boxes that have to be checked off?

A. And there's a fourth one, that it's not detrimental to the public welfare.

THE COURT: What's the third one?

THE WITNESS: The third one was that existing water rights in the basin would not be impaired.

BY MR. BLACKBURN:

Q. And so it's that fourth one that intrigues me. Not detrimental to the public welfare?

A. That's one of the criteria that has to be satisfied in order for the Commissioners to approve the permit.

Q. And how is "public welfare" defined?

A. It's --

Q. You're smiling.

A. It's not defined. It's subjective under the circumstances

of that particular application and the minds of the three Commissioners.

Q. A lot of discretion on public welfare.

A. Absolutely.

Q. Now, who owns the water that flows in the streams and rivers of Texas?

A. State of Texas.

Q. Unqualified, no question about it?

A. No question about it. The statute's very clear that all water in the State is owned by the State of Texas, held in trust for the people of Texas.

THE COURT: Flowing water?

THE WITNESS: Ma'am?

THE COURT: Does it have to be flowing water or --

THE WITNESS: Surface water. Any surface water in the State.

THE COURT: Like any lake or pond?

THE WITNESS: Yes, ma'am, lake, pond, stream, bay, estuary, anything other than ground water.

BY MR. BLACKBURN:

Q. How about rainfall that --

THE COURT: I'm sorry, say that again. Anything other than --

THE WITNESS: Anything other than ground water.

THE COURT: What's ground water? You mean --

THE WITNESS: Water beneath the surface.
THE COURT: Oh, okay. Well water kind of stuff.
THE WITNESS: Well water.
MR. BLACKBURN: Right, well water.
THE COURT: I got it.
BY MR. BLACKBURN:
Q. And what about when it rains and water flows over the surface of the land? I'm a landowner. Can I grab it?
A. You can. That's what's called diffuse surface water. And under the statute a landowner is entitled to capture and use diffuse surface water without any authorization, so long as it does not enter a stream. If it enters a stream, it becomes State water.
Q. So as soon as it goes into a defined bed and bank structure, it's State water?
A. Yes, if that defined bed and bank is a State stream.
Q. Is there a list of State streams?
A. There are, there are judicial definitions.
Q. Now, with regard to permits, we saw some examples both of a certificate of adjudication and we saw an example of a water rights permit. And --
THE COURT: Wait a minute. There's no such thing as a private lake or pond?
THE WITNESS: Well, yes, Your Honor, there is. I mean, obviously a stock tank on private property would not be,

I don't think, under the judicial definition, State, State waters. But if it's on a navigable, if it's on a navigable stream --

THE COURT: Navigable, I thought it was navigable.

THE WITNESS: Well --

THE COURT: Because there are all sorts of lakes that are connected with little navigable streams.

THE WITNESS: Yes.

THE COURT: As small as the navigation is, even a row boat makes it navigable to get from one lake to another to another.

THE WITNESS: Navigable --

THE COURT: Is this right?

MR. BLACKBURN: This would be federal -- that's, I think that's certainly under 404 of the Clean Water Act.

THE COURT: No, I had a case about the State.

MR. BLACKBURN: Okay.

THE COURT: And the, it said all these -- in fact, it was O'Connors, I think.

MR. BLACKBURN: I was not involved in that litigation, so I can't --

THE COURT: Maybe it was the federal government.

MR. BLACKBURN: But federal, certainly federal jurisdiction, as you were describing it, that goes up the waterway, up -- and there has to be what's called a nexus, with

navigable waters of the United States, or navigable waters generally that --

THE COURT: It was.

MR. BLACKBURN: -- goes up the streams.

THE COURT: It was. That's why I had it, it was a federal case.

MR. BLACKBURN: I would --

THE COURT: But the State of Texas claimed ownership in the land, and you had to get a permit to do whatever they wanted to do on this water, that turned out to be navigable because it was connected. So it involved the State and the federal government and the O'Connors.

MR. BLACKBURN: There are some times that those all overlap, and it gets very interesting.

THE COURT: I hope the definition of the State ownership, though -- because in that case I decided even if the State or the O'Connors owned it, and whoever, whichever it was, neither one of them gave permission to this other person to come on.

MR. BLACKBURN: Then you --

THE COURT: And I thought it had to do with navigable waters.

MR. BLACKBURN: You can --

THE COURT: Was anybody here in that case from the State?

MR. BLACKBURN: Let me, let me ask this question.

THE COURT: It was a treasure ship.

MR. BLACKBURN: That, okay, I thought that was what it might be, but I was not involved.

THE COURT: It was the treasure ship that he saw off of Google Earth.

MR. BLACKBURN: I understand. I have seen some of the images.

BY MR. BLACKBURN:

Q. With regard to state ownership --

THE COURT: Or in your pancakes. Go ahead.

BY MR. BLACKBURN:

Q. Under state ownership of water, is there essentially waters that have been certified to be, or beds and banks that have been certified out to be essentially navigable waters of the State of Texas?

A. Yes.

Q. And that was done by the General Land Office. Correct?

A. Uh --

Q. And it was on the patents that were issued?

A. I don't, I don't know.

Q. That's not your area?

A. No.

Q. Okay.

MR. BLACKBURN: May we move on, Your Honor?

THE COURT: Please.

BY MR. BLACKBURN:

Q. Now, in terms of enforcement of water rights and kind of knowing who's doing what with water rights, would you describe essentially the differences between an honor system and a Water Master system?

A. Yes. In all --

Q. Please do.

A. In all of those river basins in Texas where there are not currently designated Water Master operations, the enforcement of water rights in those basins is, for all practical purposes, on an honor system. In other words, the TCEQ enforces those water rights basically based on complaints that they might receive from competing water rights users. Or water rights are enforced through private enforcement actions, if you will, between water rights. It could be lawsuits or anything else. But that's what the honor system -- that's what we refer to as the honor system, because it deals with all the basins outside a Water Master.

Where we have a Water Master, which is in the Rio Grande and in the South Texas Water Master, the enforcement of water rights is through the Water Master program, as far as the TCEQ is concerned.

Now, it doesn't necessarily extinguish the right of a water rights holder to pursue independent actions, but

certainly the TCEQ has a formal enforcement role through the Water Master program in those basins.

Q. And is there independent statutory authority that's granted to the Water Master?

A. Yes.

Q. The Water Master's got their own set of enabling legislation?

A. They're part of Chapter 11 of the Water Code.

Q. Just explain in a broad, general sense the difference between Chapter 5 and Chapter 11.

A. Chapter 5 of the Water Code is the, what we call the general provisions. It provides all the very general authority and conditions applicable to the TCEQ, whereas Chapter 11 is known as the Water Rights chapter. It deals with all the water rights, permitting, enforcement, Water Master, water supply contracts, all of those things.

Q. Now, from the standpoint of some of the issues that we've talked about in this litigation, there's been a process called the Senate Bill 3 process that has been and will be discussed. Are you familiar with the Senate Bill 3 process?

A. I am.

Q. Could you describe, in a broad, general sense, sort of the policies and procedures established under Senate Bill 3?

A. Well, it was a very elaborate mechanism put in place by the legislature in 2007 that was intended to develop in each

river basin a, a flow in that river basin below which the river would not be allowed to drop, in order to protect instream uses and flows into the bays and estuaries.

And it would be done through the determination and designation of an environmental flow condition by the TCEQ, and those, that would actually become a provision in any permit, any new permit issued or any amendment to an existing permit in which the water under that water right was increased. Those new permits or those amendments for increased use would be subject to that environmental flow condition.

Q. Now, were you involved in the negotiations that led to the creation of Senate Bill 3?

A. Yes.

Q. How?

A. Well, as a Commissioner, I was very interested in that particular issue. It's one that had languished in the legislature for many years. And in 2007, it seemed to have some legs. And I was very interested in it and got involved in a number of discussions among some of the primary stakeholder interests that were considering that legislation or considering opposing that legislation. And the whole effort was to try to see if there was some compromise that could be reached that would address all the different interests and concerns that were involved with it.

Q. And the Senate Bill 3 that passed, did it have exemptions

or grandfathering provisions provided?
A. Yes.
Q. And what were they?
A. Well, first of all, it didn't apply to anything prior to September 1, 2007.
Q. Now, wait. Stop there. Doesn't apply to anything; what's "anything"?
A. Any permit.
Q. So any permit issued prior to September 2007 Senate Bill 3 does not apply to.
A. Correct.
Q. Okay.
A. It also expressly said that it only applied to new, new permits and amendments to existing water permits in which there was an increased demand for the water. So it's a perspective approach. Unless it was a new permit or a new authorization for more water, it did not apply. And thirdly, it did not apply to domestic and livestock uses.
Q. So was it an express agreement sort of that was made as part of the passage of that Senate Bill 3 that those exemptions and grandfathering provisions would be put in there?
A. It was understood and agreed that the only way that legislation would ever pass is if those exemptions were in there.
Q. And was it any secret that they were in there?

A. No.
Q. Now, is there emergency authority that is available under the general water statutes of the State of Texas to the TCEQ?
A. The TCEQ has emergency authority just across the board. They can issue an emergency order to basically do anything that's necessary or appropriate to carry out their duties and responsibilities on, in an emergency situation.
Q. Now, do those emergency powers extend to bays and wildlife?
A. I believe they could.
Q. Have they ever been used that way, to your knowledge?
A. Not to my knowledge.
Q. Now, under Senate Bill 3, even if there are some provisions that are provided to new permits that aren't grandfathered, can TCEQ suspend those?
A. Repeat that for me again, please.
Q. Sure. Under Senate Bill 3, there are the grandfathered permits that we discussed. But if a new permit were issued subject to, if you will, the instream flow requirements or the bay inflow, can TCEQ suspend those inflows or instream requirements?
A. The statute expressly requires them to suspend the inflow provisions in times of flow that's not sufficient to meet the water rights.
Q. So if we run into a situation where we really, really need

the flow into the bays --
A. The statute requires them to suspend those flows.
Q. So it allows for environmental flows when there's lots of water, basically?
A. When there's enough water to meet all the water rights in the basin.
Q. But when there's not, bays and estuaries and instream flows get cut off, under Senate Bill 3.
A. Yes.
THE COURT: Okay, wait a minute.
THE WITNESS: Excuse me?
THE COURT: I need to hear that again. I'm not understanding this.
THE WITNESS: Which part, Your Honor?
THE COURT: You say that right now the TCEQ could suspend --
MR. BLACKBURN: Let me --
THE COURT: -- permitting water?
MR. BLACKBURN: No. Let me say that again.
BY MR. BLACKBURN:
Q. Under Senate Bill 3, there is a process that's created that basically makes provision for incorporating environmental flows and bay and estuarine inflows into new permits that are issued if, in fact, an overall process has been adopted for a basin, for example.

A. Correct.
Q. Now, it doesn't apply to all of the existing permits prior to 2007.
A. Correct.
Q. But I've got a new permit, after 2007, it comes in, and under Senate Bill 3 some type of flow is imposed.
A. If the Senate Bill 3 process has worked its way to culmination and the Commission has adopted an environmental flow provision for that basin, then that provision will be put in that permit, such that you cannot withdraw water below that level.
Q. Except you just said there's a provision that the legislature put in, did I understand you to say that requires suspension of that environmental flow requirement?
A. Yes.
Q. And under what conditions is that environmental --
THE COURT: Okay, say that again. That's what I'm not getting.
MR. BLACKBURN: Right.
THE WITNESS: Your Honor, there is a provision in the statute that says that if there is one of these environmental flow provisions in a permit, or in any permit in that basin, and you have a emergency situation in which there is not sufficient water available to address, to satisfy the water rights needs in the basin, that the TCEQ must suspend that

environmental flow limitation.

BY MR. BLACKBURN:

Q. So is it sort of like --

THE COURT: I don't know if I'm losing it, but --

MR. BLACKBURN: It's sort of like giving something, except when times get tough, it gets taken away.

THE COURT: Okay, that's what I thought he said, that it suspends the consideration of the estuaries and bays in consideration of the prior permit.

MR. BLACKBURN: Exactly. The prior permit --

THE COURT: So what's the point of the -- oh.

MR. BLACKBURN: Oh. Bingo.

THE COURT: I'm going to hear from them, though.

MR. BLACKBURN: I understand.

THE COURT: They've got another opinion.

MR. BLACKBURN: But that's our position, Your Honor. It's a crafty little process.

BY MR. BLACKBURN:

Q. Were you involved in the discussion of that provision?

A. Unfortunately, yes.

Q. It was well-known? It was negotiated?

A. It was well-known among the primary stakeholders that were trying to negotiate a compromise.

Q. Wouldn't have passed the legislature without it?

A. Not with the opposition that it faced.

THE COURT: What was the opposition?

THE WITNESS: The major water rights holders in the State.

THE COURT: What do you mean? Not the riparian rights, but --

THE WITNESS: No, no, the river authorities, the industries, the cities.

THE COURT: That's big.

THE WITNESS: It's sizeable opposition.

THE COURT: Okay. Same as we've got here.

THE WITNESS: Some of which.

THE COURT: Okay. Okay.

BY MR. BLACKBURN:

Q. Now, a permit, can a permit be altered, can the usufructory right, which I guess I ought to ask you to define --

THE COURT: I know what that is.

MR. BLACKBURN: Good.

THE COURT: I hate to say it, but I do.

BY MR. BLACKBURN:

Q. Can the usufructory right be modified by the emergency authority of the TCEQ operating under the authority of other laws?

A. I believe it can.

Q. Now, drought management. Drought management is an

emerging topic. Are you familiar with a new statute that the legislature passed recently? I think Mr. Vickery talked about he's got a little more authority, he thinks, under the drought management concepts.

A. Yeah, it was actually a provision that was added to the TCEQ sunset legislation this last session.

Q. And what is sunset legislation?

A. Well, all state agencies have to go through a sunset process every 12 years in which the legislature must affirmatively renew that agency, or it will not continue to exist.

Q. And this drought management authority, is this sort of a new kind of policy concept, or had it existed previously?

A. I agree with Mr. Vickery, I think it generally existed prior to that. The legislature clarified some things, including some restrictions on that authority.

Q. And during these droughts, do you, does the TCEQ have to really be constrained by "first in time, first in right" in drought management plans?

A. In my opinion, they do not.

Q. And during water shortages, does the Water Master have authority to undertake unique management actions?

A. In my opinion, he does.

Q. And with regard to the TCEQ, can endangered species be considered an emergency?

A. You mean a threat to the endangered species? Is that what, I mean --
Q. As opposed to litigation over endangered species. Yes, the threat to endangered species.
A. I believe it could be.
Q. Now, I want to ask you to be creative, to think of different things that could be done, that if the State were trying to find some water to get to the bay, what might they do. And I'd just like to throw some scenarios out, and from a policy standpoint ask you if you think that these are policies that might have some possibility of being able to be implemented, assuming someone had the will to do so.
A. Okay.
Q. Now, for example, domestic and livestock, these are exempt uses. Right?
A. Correct.
Q. Is there any limit to the ability of TCEQ to require an inventory or registration?
A. I do not believe there is any limitation whatsoever to require an inventory. To the extent that registration carries the context of some kind of permitting authority, I don't believe that the TCEQ could require registration. I think they could require some kind of identification of water, domestic and livestock, and some kind -- and develop some kind of inventory from that identification.

Q. Now, with regard to this concept of public welfare, could public welfare be interpreted such that it becomes a way in which to modify existing permits?
A. I believe it could.
Q. So if, for example, endangered species protection were decided to be in the public welfare?
A. Absolutely.
Q. Now, with regard to permits that are in existence but not being used, what could be done?
A. The TCEQ could certainly initiate, as they are required to do under the statute, surveys to determine if that water is going to be used and put to beneficial use. And if they find that there's not any reasonable expectation that it's going to be put to use, then they could initiate the cancellation process of water rights. The statute allows unused water rights to be canceled in whole or in part.
Q. Now, what about direct and indirect reuse of water? First of all, let's be sure we're clear. When water is taken out on a, say a industrial permit, goes in, it's used by the industry, it goes through a waste water treatment plant. And if that water is taken out of the waste water treatment plant and, for example, recycled back into the process, is there a permit required to recycle and reuse within the facility?
A. Within the facility?
Q. Yes.

A. No, sir.
Q. And if I wanted, let's say I'm a company and maybe I had a environmental project. A lot of times you see wetlands next to some of these places. If I wanted to put the water in the wetlands, could I do it?
THE COURT: What water? I missed the starting point.
MR. BLACKBURN: I'm an industry.
THE COURT: Okay.
MR. BLACKBURN: I've taken water out. I use it in my process. I treat it. I don't want to put it back in the stream. I want to take it over here and put it on my property and just water something.
BY MR. BLACKBURN:
Q. Can I do that?
A. You can, as long as those wetlands are not considered water in the State.
THE COURT: Considered what?
THE WITNESS: Water in the State, State water.
BY MR. BLACKBURN:
Q. How about landscaping? Let's go simple.
A. Landscaping, you could do that.
Q. Landscaping. I could take it out of the end of the pipe and dump it. And wetlands get tricky. I understand.
A. Yes.
Q. But I could take it, I could plant -- I could water

flowers forever?
A. One, I need to qualify one thing, Mr. Blackburn. You can do that without seeking, without needing permit authority if your underlying water right does not require you to put it back in the stream.
Q. Now, do most permits require it to be put back in the stream?
A. Permits do not. The statute says that surplus water, unused water should be returned, must be returned to the stream unless you get approval to reuse it.
Q. Is that enforced?
A. I would have to say no.
Q. Now --
A. I mean, as a practical matter, it just occurs, but it's not a subject of enforcement.
THE COURT: So how much would all this cost, I mean, what you're asking me to do? Do you have any estimates of that?
MR. BLACKBURN: I, we have not, Your Honor. I think we could certainly come up with some estimates if --
THE COURT: Wouldn't that be part of this trial, I mean, to tell me, "I want you to do, I want this Court to do this, and it will cost this"?
MR. BLACKBURN: Well, I actually think that what we're talking about is setting up a process to determine these

things, and that this, these are options that could be implemented through a process. And our next witness, Andy Sansom, is going to talk about a process that was implemented under the Endangered Species Act in Texas very much in a similar situation.

So it's our belief that it's not a question of doing it all right now, coming out of this litigation, although certainly some things could be. But more importantly, either a Habitat Conservation Plan or a Recovery Implementation Plan and a process, perhaps with Court continuing supervision --

THE COURT: That's what I was going to ask. Does this kind of a thing require Court continuing supervision? Like a desegregation case. I mean, you say, "Try this plan and come back and tell me how it works." And then it just goes -- that's, I assume that's what you're asking.

MR. BLACKBURN: That is what I'm asking, Your Honor, because frankly anything I think less than that perhaps wouldn't be convincing to the State.

MR. WILLIS: Well --

THE COURT: Well, I mean, you wouldn't just ask me to order them to go forth and do right.

MR. BLACKBURN: Absolutely. Well, I'd love to, but I would not. What I would ask you to do is to order -- what I would argue that you do is initiate a process that is, or to cause a process to be initiated very much like what was done in

the endangered species litigation in the Edwards Aquifer.

THE COURT: Edwards Aquifer.

MR. BLACKBURN: And we will bring a witness in next to describe what has happened under that. And we think it is a perfect example of how success can be obtained.

MR. WILLIS: All we would point out, Your Honor, is for, that it's a little unfair to ask a federal court to order a state agency to enter into a process without at least consideration of funding mechanism for any such issue.

THE COURT: I wouldn't think so.

MR. WILLIS: And I'm not saying it has to be made a determination, but it certainly should be a consideration.

THE COURT: It seems like the only thing I could do is say -- it seems like there ought to be a process, just theoretically, which I do think there ought to be a process to protect endangered species. I think the State is probably in agreement with that. What they can do is another thing altogether. Right?

MR. WILLIS: The State would point out some of the testimony you've already seen, that many processes are already ongoing. Again, it's TAP's belief they're inefficient or not sufficient, and we believe, we hope that we can convince the Court that they are.

MR. BLACKBURN: And ultimate --

THE COURT: Well, I just think everybody here could

agree that it would be important for the State to recognize and to protect endangered species.

MR. WILLIS: I think everyone agrees that --

THE COURT: I think everybody agrees with that.

MR. WILLIS: -- that we do our best to, within the statutory power --

THE COURT: So --

MR. WILLIS: -- of the TCEQ to enforce, to protect the endangered species.

THE COURT: Then the issue is how does that happen. If I believe the previous testimony that a taking has occurred, just theoretically, that a taking has occurred and that it's mismanagement by TCEQ that caused the taking, resulted in proximate cause and damage, et cetera, to the endangered species --

MR. WILLIS: With all due --

THE COURT: -- then what on earth could I -- I know you're never, you'll never agree to that. I don't want to ask you to. I'm just saying theoretically.

MR. WILLIS: Well, theoretically, what I was going to say, after several witnesses, and at 4:30, I would like to be able to brief the Court on that, rather than speak from my feet on that issue.

THE COURT: Thank you, sir. I'm sorry. That was an unfair question.

MR. WILLIS: No, I just want to make sure that we're not -- because first of all, I want to make sure I don't give the Court any misinformation on it. So I'd really rather make sure I, you know, visit with co-counsel on it and everything and make sure --

THE COURT: I just don't think -- you know, the Intervenors and the State have focused their briefing on how it wasn't a taking, how there's no, how there's not redressability, on and on and on, that kind of thing. But what if we go beyond that. What is it that I could possibly do --

MR. WILLIS: Well, I think you've heard from Mr. Vickery --

THE COURT: -- set up a one-person --

MR. WILLIS: As a matter of fact -- sorry to interrupt, Your Honor.

THE COURT: I mean, it just seems like somebody, they're asking to set up a one-person overseeing of the whooping cranes. Now, I don't know if I have the authority to do that. I think there's some problems with that.

MR. WILLIS: I think we all understand that the Court would like to hear more about potential remedy issues.

THE COURT: Oh, I'm not saying, you know, I just couldn't, I'm just waiting to hear what I'm being asked to do.

MR. BLACKBURN: I'm sorry, we're trying to get there, piece by piece.

THE COURT: I know you're laying the foundation. I'm sorry. I'm just jumping ahead.

MR. BLACKBURN: That's okay. I mean, I understand. I mean, we hear your urgency. I just wanted to try to make sure that we had it established with our water policy expert that we think there's a lot of authority to do a lot of different things, many of which have never been done before. And may I ask -- do you want to continue this discussion or --

THE COURT: No, go ahead. Keep going. It's just that it's frustrating to have him tell me what the Court can do. I just don't -- I'm not sure that I see that as a court function. I see the court function as saying yes, it is appropriate to come in to see if the Endangered Species Act has been violated, if there was a taking, if there was proximate cause. But then my concern is, what do I do if I find all that?

MR. BLACKBURN: And I think all we're trying to do here was to say that there are some creative options that are available if we were to go down a particular pathway, and the next witness will come in and talk about --

THE COURT: Okay.

MR. BLACKBURN: -- what that creativity may look like.

BY MR. BLACKBURN:

Q. And with that, one last question. Will power.

A. I'm sorry?
Q. Will power. Would you explain the role of --
THE COURT: Public will power.
MR. BLACKBURN: I'm sorry?
THE COURT: Public will power.
MR. BLACKBURN: Public will power.
THE COURT: The xeriscape gardens.
MR. BLACKBURN: No, no, no, no. This is the will power to change in the State of Texas.
BY MR. BLACKBURN:
Q. You've been around the political process in Texas for a long time. How does Texas respond to change?
THE COURT: How do we all respond to change? I bet about --
MR. BLACKBURN: I pass the witness, Your Honor.
THE COURT: I bet about the same way. Listen to me responding if you want me to change something.
MR. BLACKBURN: I'm happy for you to respond, Your Honor.
MR. WILLIS: Give me one minute, Your Honor?
THE COURT: Surely.
(Counsel conferring off the record.)
MR. WILLIS: Your Honor, I'm going to offer Defendant's Exhibit 397, which is actually the report from Plaintiff's expert Larry Soward, Defendant's Exhibit 397.

THE COURT: Any objection?

MR. BLACKBURN: Well, I would just simply say, Your Honor, we haven't typically been offering experts' reports. I'm happy for it to come in. It does have a lot of legal citations to it, which I'm happy for you to receive, but I figure I ought to be, you know, forthcoming about that.

MR. WILLIS: Well, as a matter of fact, that's one of the reasons that it is being offered, Your Honor, because the way we understood, based on Ms. Snapka's objection, is --

THE COURT: Well, this is her witness.

MR. WILLIS: I'm sorry?

THE COURT: I said, "This is her witness."

MR. WILLIS: No.

THE COURT: The one who makes the objection does the cross-examination.

MR. WILLIS: Your Honor, I had prepared for cross-examination of this witness.

THE COURT: Okay. Just a reminder, don't do that again.

MR. WILLIS: I apologize.

THE COURT: Thank you. Go ahead.

MR. WILLIS: And but we felt --

THE COURT: So do you want me to hear all about his legal, interpretation of the law on that?

MR. WILLIS: No, I don't want to hear the

interpretation. What I want to do is he's offered his opinion, and that's the purpose of him being offered is he offered his opinions on what Texas, or TCEQ has started to do.

THE COURT: Okay.

MR. WILLIS: All I'm going to ask him to do is just give us the cite. You don't have to interpret the law, but I want to know what you're basing that on. That's all I want.

THE COURT: 397 is admitted.

MR. WILLIS: Thank you. And also, Your Honor --

THE COURT: Actually, you know what, I'm completely wrong. I keep forgetting that you all are two separate entities. Apologize, Ms. Snapka.

MS. SNAPKA: Thank you.

MR. WILLIS: Your Honor, we'd also offer Defendant's Exhibit 398, which I know that it might seem somewhat redundant, but I'll try my best to make sense as we go through. But what I've done is just --

THE COURT: Any objection to 398?

MR. BLACKBURN: No, Your Honor.

THE COURT: 398 is admitted.

MR. WILLIS: Thank you. And may I hand a copy of each of them to Mr. Soward?

THE COURT: Absolutely.

CROSS-EXAMINATION

BY MR. WILLIS:

Q. Hello, Mr. Soward.
A. Good afternoon, Mr. Willis.
Q. Mr. Soward, I put in front of you or I've handed you a copy of Defendant's Exhibit 397. First of all, do you recognize that exhibit as the report that you filed in this case?
A. Yes, sir.
Q. And that had your opinions as of the time, the time you filed it, I guess, your opinions that you're offering in this case on July 28th, 2011?
A. Yes, sir.
Q. And what I've done on Exhibit 398, Mr. Soward, is I tried to take word for word your Table of Contents with the only two exceptions I had is between Executive Summary and General Discussion, and I took this directly out of the body of your report. You've put Roman Numeral II, Discussion, but it looked like you left it out of the Table of Contents from Page 1 on your, the actual body of your report. And so I added that Roman Numeral II in. And other than that, I tried to follow what, the actual outline of your report. So Roman Numeral I, Roman Numeral II, and then Roman Numeral III. Does that make sense? And the reason is you were kind enough to do your report in an outline form, which allowed me to follow through it a little easier.
A. Yes, sir. Excuse me. Yes, sir, I see what you've done.

My Table of Contents didn't use Roman Numerals or anything else.

Q. Right. All I did was add the Roman Numerals to it.

A. Yes, sir.

Q. But you, but in fact the body of your report did use those Roman Numerals in outline form?

A. Absolutely.

MR. BLACKBURN: Could you put that on the ELMO or display it, please?

MR. WILLIS: Absolutely.

THE WITNESS: And Mr. Willis, can I assume that other than doing, putting in the Roman Numerals and alphabetical numbers and the numerical numbers, that everything else is exactly like the Table of Contents?

BY MR. WILLIS:

Q. The only difference, I'll represent to you and to the Court, is on your Table of Contents, again, you left out the word Discussion under Roman Numeral II. The body of your report has that word.

A. Yes, sir, I see that.

Q. And then your Table of Contents says, "Table of Contents." And at the top of this form, I put "Report of Larry Soward."

A. Yes, sir, I see that.

Q. Is that fair?

A. That's fair.

Q. Okay. This is Page 1 of Exhibit 398 that I've just shown you, which actually goes through Roman Numeral I and Roman Numeral II, and this is Page 2 of that same exhibit, which finishes with Roman Numeral II and then goes to Roman Numeral III.

A. Correct.

Q. Okay. Now, I know that might seem unnecessary, but it was important for me to try to get organized so I could understand the actual opinions that you're offering in this case, Mr. Soward. So let's talk about that.

First of all --

THE COURT: You want to put it on the -- are we putting it some place or --

MR. WILLIS: I'm sorry?

THE COURT: No, that's okay. I thought you were showing it and then took it off.

MR. WILLIS: We'll leave it up there.

THE COURT: You want to leave it on? You don't have to, I just --

MR. WILLIS: Okay. Well, I'll work my way through it actually, Your Honor.

BY MR. WILLIS:

Q. First of all -- and again if you need to refer to your report, you've got it in front of you. Under Section 1 of your report, which was probably, oh, three-quarters of a page,

that's basically, you entitle it Executive Summary, and that's, it kind of discusses that you were retained in this case to offer an opinion and what you intended to kind of offer an opinion on. Correct?

A. Correct.

Q. I'll jump down to C -- I'm sorry -- Roman Numeral III on the second page, which is the last page of your report. It's the conclusion that you ultimately reach on the final page of your report. Correct?

A. Yes, sir.

Q. I think, if I remember right, that's Page 17?

A. It's 18 on my copy.

Q. 18. I'm sorry. And so basically, for most of the report, the vast meat of the report would be under Roman Numeral II, where you have entitled "Discussion."

A. Correct.

Q. Okay. Now, you've broken Roman Numeral II down, the meat of your report, into three areas, which are generally A, B, and C. It looks like under II-A of your report, you went through and just kind of gave somewhat of a brief history of Texas law up to present and the current state of the Texas law. Is that fair?

A. Yes, sir.

Q. And in fact, you've gone through that in direct with Mr. Blackburn and kind of brought us up to speed.

A. To some extent, yes.
Q. And although I've made my apologies to the Court about my feeble attempt to explain certificates of adjudication, I know I wasn't correct, but I wasn't far off, was I?
A. You were half correct.
Q. Okay. Well, that's not bad. B, under Roman Numeral II, is basically, without reading the whole statement there, and we'll go through those in a second, but what you're saying under B is that's where you go through and say the different aspects of TCEQ's authority. Correct?
A. Yes, sir.
Q. Okay. And then jumping over to the second page again to finally Roman Numeral II-C, that's the area of the report that you say basically these are some of the actions, I think Mr. Blackburn said in his direct, let's get to the creative part. But essentially, that's where you get to the report where you say these are some of the actions I believe TCEQ can take.
A. Yes, sir, they're some of them.
Q. Okay. Fair enough. Was there anything -- since this is your report, is the report still accurate?
A. Yes, it's accurate as to what it covers.
Q. Well, I mean, is there anything you need to add to your report?
A. Well, I --

Q. I mean, we never got a supplement to the report, so is there anything you want to add to the report?

MR. BLACKBURN: Your Honor, I mean, we're not -- we didn't offer the report as his expert testimony. I mean, it was what was done in discovery. His deposition was never taken. And you know, what we presented to the Court was his testimony as we would represent it to the Court as an expert on water rights. I'm happy to have that report --

THE COURT: All right. I agree. Mr. Willis, you can't cross-examine him. It's over. Go ahead.

MR. WILLIS: Thank you.

BY MR. WILLIS:

Q. Again, and all I'm trying to find, in fact, even if you look on Page 1 of your report, which is 397, under Executive Summary, I think on line 26, you say, "To the extent allowed, I may supplement this report with additional information and opinions, particularly if any additional information should be made available for my review." Did I read that correctly?

A. Yes, sir.

Q. And all I'm trying to find out, because I'm trying to work my way through here pretty quick, is there anything you want to add that you can think of that you've left out of this report, as far as your opinions that you're offering for the Court in this case?

A. I can certainly offer some more creative options if asked.

Q. Okay. Well, that's -- that would be under Section C. We'll get to that. You think other than what's in your report you may have some you want to add to what you already have in Section C?
A. I could.
Q. Okay. Is there any other areas of your report you think that as of right now you might want to add anything to?
A. No, it's fine.
Q. Okay. Let's start with some of the items that you have under Roman Numeral II-B under TCEQ Authority to Manage Surface Water Rights and Uses in Times of Shortage or Other Emergency.
A. All right.
Q. Now, on your report, the first one that you have is that TCEQ has broad powers to manage water rights and uses, including managing the water rights and uses with consideration of bays and estuaries. Correct?
A. Correct.
Q. And will you give me the Water Code -- or let me rephrase that. Tell me what your legal cite is for what your position is in that section.
A. You mean other than the ones I've listed? Or I've listed --
Q. Is there anything in addition to what you've footnoted? You make a good point. Let me ask you this. Throughout this report, you've put footnotes, most of which from I think this

point forward are either Water Code sections or maybe some Administrative Code sections. Correct?
A. Correct.
Q. Is, can the Court assume or can we assume that each time that you've given an opinion based on, that you've set out in this report that, your findings or your opinions, I'm sorry, are based on those particular sections of either the Water Code or the Administrative Code that you've cited?
A. Yes. I tried very hard in developing this report to include sufficient citations to the proposition that I was writing about.
Q. And, Mr. Soward, the reason I'm going through it like this is we will do supplemental briefings later, as the Court has asked. All I want to know is so the Court can have an idea of what the Plaintiff's expert on this is basing this on. Okay?
A. Yes, sir. I'm not saying that I put every cite down here, but every cite I put down, I'm comfortable with Your Honor looking at those and considering them and assessing them.
Q. Okay. While we're on Number 1, by the way, I want to make sure, you do agree -- because it was worded a little bit different in direct, and I'm going off the, I'm not going on the report right now, I think it's in here but slightly different -- is you agree that adjudicated water right holders have a vested property right to use, to the use of the water?
A. Yes, under statute.

Q. Okay. Fair enough. And I think if you look at Page 5 of your report, that's, I believe that's the citation that you left there in Line 3 of the report, but then you reference down to footnote 18, which is Texas Water Code 11.040(a) and 11.084.
A. Yes, sir.
Q. Okay. Now, I'll jump to the end a little bit, because when Mr. Blackburn said something on direct, I want to make sure I got this correct. And again, Mr. Soward, I give you my word, I'm not arguing with you on your position --
A. No.
Q. -- I just want to know what it is. Is it your position for the Court that TCEQ has the authority to curtail or cut off water diversions to the, to those vested property right holders, to direct that water to the help the whooping cranes?
A. Yes.
Q. Okay. And could you please tell us, tell the Court what's your authority, statutory authority that you're basing that on?
A. I start with the general proposition that I believe is cited in Texas Water Code Section 5.102 that says that the TCEQ --
THE COURT: 5 point --
THE WITNESS: 102.
MR. WILLIS: And Your Honor --
THE COURT: And that's the general section, Chapter 5?

THE WITNESS: Yes, ma'am.
BY MR. WILLIS:
Q. And Mr. Soward, if the Court wants to hear you read it, the statute, that's fine. If you need to, that's fine.
A. I don't have it in front of me.
Q. I just --
A. I was going to recite it from --
Q. That's pretty good. But I was just going to say, if you want, if you just tell us the statutory authority.
A. Yeah. 5.102 very basically says that the TCEQ has the authority to do any acts necessary or convenient to carry out its duties and responsibilities under the Water Code or other laws, either express or implied.
Q. Okay, fair enough. And besides 5.102, also on Page 10 of your report, I think are you also referring, under Footnote 62, would you say that 5 -- are you also relying on 5.120?
THE COURT: Are you objecting to this, Ms. Snapka?
MS. SNAPKA: I am not, Your Honor.
THE COURT: Okay. I just want to be clear.
THE WITNESS: Yes.
BY MR. WILLIS:
Q. Okay. Any other statutory authority that you're trying to cite that the Court needs to look at the justification for your opinion there?
A. Well, yes. There's, there's all the statutory language

that the Commission, when issuing, when issuing water rights, and when managing water resources has to consider, and to the extent practicable, provide for sufficient flows to the bays and estuaries to protect terrestrial and aquatic life. There's that general directive in the statute.

Q. Could you tell me what that general directive is? I mean, is it cited anywhere in your paper?

A. Oh, yes, if you'll give me a moment to find it.

Q. Take your time.

(PAUSE.)

THE COURT: While y'all are doing that, I think that I'm going to declare no trial on Monday and let you know in the afternoon, if that's convenient, that we'll be hopefully starting back Tuesday. And then I can just move as much criminal stuff, Ms. Cayce, up to Monday afternoon. Is that all right with everybody?

MR. WILLIS: It's all right with us, Your Honor.

MR. FERNANDES: Fine.

THE COURT: Is that all right?

MR. BLACKBURN: Do we need to call the case manager?

THE COURT: She'll call you and let you know sometime Monday.

MR. BLACKBURN: Okay. Well, then we'll work with her to make sure she knows how to -- I presume --

THE COURT: She has all your -- she needs all of your

contact information.

MR. BLACKBURN: Right. We'll do that after the end of today.

THE COURT: But let's say we start up on Tuesday at 8:30, and we'll touch base with you sometime Monday.

MS. SNAPKA: Just to make sure that you weren't in fact selected on a jury?

THE COURT: Yes.

THE WITNESS: Mr. Willis, could you help me, could you repeat the specific request you're asking me to look for? And I apologize, because I have been under the impression throughout my preparation that this report wouldn't be in front of me. And so it's a surprise that it is. So it's just taking me a little while to thumb through the 18 pages. But if you would ask me again the very specific question.

THE COURT: Do you want some time to review it?

THE WITNESS: I don't want to delay --

MR. WILLIS: I think I could narrow it down a little bit.

THE WITNESS: I don't want to delay the Court's time. I just, if you can tell me again what you're asking me, I think I'll -- I think what I was telling you was that the Commission was required to, where practicable, provide for protection of the bays and estuaries and aquatic and terrestrial life in those.

BY MR. WILLIS:

Q. Okay. And that's what I'm -- specifically what I asked you was whether or not it was your position that TCEQ has the authority to curtail or cut off water diversions to the vested property right holders, divert water to help the whooping crane. And you said yes, it was your position that they did. You cited Water Code 5.102 and Water Code 5.120. And you also referred now to some other --

A. Right.

Q. -- general statutes.

A. Right. And I'm --

Q. And I'm asking you what those other general statutes are.

A. And that's what I'm looking for.

THE COURT: I missed the earlier statute. I got 5.102, and then you mentioned another one?

MR. WILLIS: 5.120.

THE COURT: Thank you.

THE WITNESS: Let's see. It's on Page 8, and it begins on Line 10, which says that "The TCEQ, while balancing all other public interests, must consider, and to the extent practicable, provide for the fresh water inflows and instream flows necessary to maintain the viability of State streams in the regular granting of permits of the State's use of water."

BY MR. WILLIS:

Q. Okay.

A. And that cite is given as Cite Number 49, Section 11.0235(b) and (c).
Q. Okay. And that's the general ones that you were speaking about earlier?
A. That's one of the general ones.
Q. Okay.
A. I would also say in support of my answer that even in the recent legislation that we talked about earlier or Mr. Vickery talked about and then Mr. Blackburn asked me on direct about the new emergency authorization to suspend water rights during times of emergency, it talks about the temporary suspension or adjustment of any person and any water rights holder. And I believe that that is broad enough authority to allow the Commission, in times of emergency, to temporarily suspend a water right.
Q. Okay. And you believe that in times of emergency, and I'll ask you about that in a second, you believe that the Commission can suspend any water right, adjudicated, permit or otherwise?
A. Yes.
Q. Okay. By the way, "in times of emergency" under that new legislation you were talking about, who makes the determination on whether there is a time of emergency?
A. I believe the statute requires the Commission to adopt a rule that defines "time of emergency."

Q. Okay. And you would, you would recommend to the Court that such a -- there is no -- first of all, there is no rule that's been adopted at this point?
A. I believe it's in the process of promulgation through public comment and then adoption.
Q. Okay. Is it at the State --
A. It has not been adopted.
Q. Okay. Now, under Roman Numeral II-B, I think we've already discussed that, so I'm not going to go into it. That's essentially your position that you just talked about actually on direct with Mr. Blackburn about under Senate Bill 3 and the fact that you just referenced that you believe TCEQ can impose environmental flow conditions on new permits -- I'm sorry -- that those environmental flow conditions can be suspended. That's what you were referring to under Roman Numeral II-B2.
A. Correct.
Q. I think you've addressed under Roman Numeral II-B3 that's where you address that you believe that TCEQ can take into account other laws, and that's when you were referring to considering the Endangered Species Act in deciding to suspend or even cut off the vested property rights of the adjudicated right holders?
A. Yes.
Q. Okay. I was trying to move through this a little faster.
A. I understand. And I don't want to be the one to slow it

down.
Q. Now, is there anything under -- I won't go into it in detail -- under TCEQ's authority under II-B4 regarding return flows? That's essentially your section regarding return flows that you discussed with Mr. Blackburn?
A. Yes.
Q. And you've got some citations and some footnotes in here. Is there anything you want to add to that that the Court would need to consider, other than the citations that you already have in there?
A. The only thing I would say, Mr. Willis, and unless I was given time to read word for word what I've written, is that if I don't say it, I would like to add now that I believe the Commission could do two things. They could refuse to grant indirect reuse, and they could order return flows, or excuse me, surplus flows to be returned to the river and not even directly reused.
Q. But not just returned to the river, but it's your position I think you said earlier that they could order that those return flows be returned to the river specifically to be sent to the bays and estuaries for an endangered species?
A. I think either that or to protect other existing water rights, either one or both.
Q. Okay. Going on to the next one. Under II-B5.
A. Yes, sir.

Q. You indicate in there that TCEQ currently focuses exclusively on strict time priority or "first in time, first in right." And you believe that those rules, or that policy can be relaxed during, just during drought? Or in any other emergency situations?

A. I only focused on -- well, I focused on emergency situations, which to me, as a practical matter, will usually be droughts.

Q. And in your report, you refer to it for its drought management practices.

A. Yes.

Q. Okay. Is it your position then that TCEQ, during times of drought, can ignore the "first in time, first in right" priority appropriation?

A. Yes. And I think Mr. Vickery indicated they've done that with the City of Kerrville.

Q. Well, you know, that raises a good point. Is -- and we'll get to that after we finish these eight under II-B. Since I went through the organization of your report and you, again, through II-B, you give different scenarios of things that TCEQ can do, you recognize in, and I think you say in your report in some places TCEQ is not doing this at present or something to that effect. But in other places, you don't indicate that TCEQ is not following what you've recommended.

So for example, under this, under Section II-B5, you think

that in fact TCEQ is actually already doing what you've recommended?

A. No. I said -- what I said was that in the one instance that I know of, which Mr. Vickery recited under his testimony, with the City of Kerrville, they have done this. But that is totally out of the ordinary.

Q. Because it was an emergency, they determined it was an emergency situation?

A. Yeah, it was an emergency situation, and they assessed the public welfare and decided that "first in time, first in right" wasn't going to govern.

Q. And you think that's okay, though.

A. Yes, sir, I do.

Q. Okay. Again, under Section 6, I think you've talked about this with Mr. Blackburn, but I want to make sure, because it's a little -- it seems a little broad. I'm not trying to critique it. I just want to make sure.

What Number 6 is, II-B6 is, that you believe under the Water Master, or both the Water Master and the ED are given broad authority to act during water shortages. And again, you've cited at the bottom of Page 12, and although your section goes on to Page 13 in your report, there's no cites in that portion of it, but are there any other citations that you believe support your position in that section of your report?

A. Other than all the other general authority that we've

discussed up until now, this is specific to the Water Master functions in times of water shortage or the Executive Director acting in the absence of a Water Master program. And I'm citing here rules and regulations that the TCEQ has adopted that gives both the Water Master or the Executive Director very broad authority in times of drought and emergency. And those -- and to me, those are part and parcel, they're more explicit enunciations of the broad powers that we've already discussed.

Q. Okay. I just want to make sure, if I understood what you just said, that when I ask you about any other authorities other than what you've cited, you said none other than the general authorities that we discussed. Which when I asked you earlier and you said a general authority, you ended up referring to 11.0235(b) and (c). Is that what you're referring to here?

A. Any general authority that I've cited in my expert report.

Q. Well, I'm just asking you, what are you calling a general authority, Mr. Soward, so we can make sure when we brief this for the Court that we understand what you're basing your opinion on?

A. When I say "general authority," what I, what I typically think of is something like Section 5.102, where you have a very broad expression of powers and duties and authorities in the statute. There's numerous incidences of that in the Water Code

and in the TCEQ's regulations.

More express authority is where the statute or the rule may say, you can do X. And on Page 12, you'll see five very specific items, well, five items in which the TCEQ regulations say that the Water Master can do in times of emergency, and with Number 5 being "Take any other action necessary."

So even with the specific enunciations of authority, there's a general as kind of a catch-all. You can do these things and anything else we need to do to take care of this situation.

Q. But as you sit here now, you've now added 5.102. Is there any other statutes that --

A. Mr. Willis, if you want me to answer that question directly, I'm going to need to sit down and read this entire report and make a list of all the citations that would be in direct response. My -- the best answer I can give you right now is the cites I have put in this paper provide both general and specific authority for every proposition I make.

Q. I'm just asking what you base it on, Mr. Soward.

A. There, it's all right here.

Q. Okay. So if it's not in here, then that wasn't what you based it on when you wrote this report?

A. Correct.

Q. Fair enough. Now, let's look at that, by the way, under II-B6. When you talked about some of those things, you said

what TCEQ can do. One is to cancel or modify, as needed, any existing declaration of intent to divert or impound. First of all, you've already seen TCEQ does that currently in certain situations. Correct?

A. Yes, in certain situations. Yes.

Q. Number 2 there, you have, "Order that water right holders with reservoirs allow inflows to pass through such reservoirs to the extent necessary to honor downstream senior water rights, demands for domestic and livestock purposes, minimum stream flow requirements, minimum release requirements, and other conditions." You recognize that they do that now?

A. They do some of that.

Q. Okay. And I guess by qualifying that, you would say that they don't do it specifically to protect, to make sure that enough water gets down to protect the whooping crane.

A. Correct.

Q. Okay.

A. Or the bays and estuaries generally.

Q. Well, to be fair, though, in some of the permits, especially post-'85, there are some requirements in there for stream flow requirements that are specific to the bays and estuaries.

A. Yes, post-'85.

Q. Okay, thank you. Number 3, "Order that persons with reservoirs exempt from permitting allow inflows to pass through

such reservoirs for the protection of downstream domestic and livestock users." They currently do that on occasion.

A. On occasion.

Q. Thank you. Number 4, "Order that diverters limit or cease diversions to the extent necessary to honor downstream senior water rights' demands for domestic and livestock purposes, minimum stream flow requirements, minimum release requirements, and other conditions."

THE COURT: Where are you reading that?

MR. WILLIS: That was on Page 12 --

THE COURT: Okay, of 397.

THE WITNESS: Yes.

MR. WILLIS: Yes.

THE COURT: Okay.

MR. WILLIS: Specifically on Lines 32 through 35.

BY MR. WILLIS:

Q. On occasions, they do that currently.

A. They do some of that.

Q. Okay. And again, that would be the same qualification that you just spoke about?

A. Yes.

Q. Okay. "Take any other action necessary to ensure that downstream senior water rights' demands for domestic and livestock purposes, minimum stream flow requirements, minimum release requirements and other conditions are administered in

accordance with applicable laws." You'd agree that they do that on occasions at this point. Correct?

A. They do some of that.

Q. And again, would that -- your qualification would be based on what you just told me on the other issues?

A. Yes.

Q. Okay. I'll go to II-B7. I'm trying to finish this up, Mr. Soward.

A. That's all right. I've got all evening.

Q. Where you say, "No rule prohibits TCEQ during times of emergency or water shortage from considering endangered species. Instead, the TCEQ has authority to continue to supervise each water right."

A. Yes.

Q. Would you paraphrase that, that during times of emergency or water shortage, that it's your opinion that TCEQ currently has the authority in their allocation of water to specifically include not just all the diverters that we've spoken about previously, both certificates of adjudication and permits, but to also specifically consider sending water just to the bays and estuaries for protection of an endangered species?

A. Yes, because it talks about other conditions other than the protection of downstream senior and superior water rights and domestic and livestock uses.

Q. And it seems like, even though you did give some cites in

there, it seems like the way you set up the heading on Number 7 is, you're saying that no rule, either a statute or an Administrative Code provision specifically prohibits TCEQ from doing that.

A. Correct.

Q. Okay. I'm going on to II-B8, and this is under the new legislation.

A. Yes.

Q. That's what you've already referred to, isn't it, with Mr. Blackburn regarding the changes in the sunset provision? Is that what you were talking about?

A. Yes, sir.

Q. Okay. I don't think we need to cover that again.

Although, I would like to point out this. On Page 15 of your report, still under II-B8, you indicate in there on Line 17 through 19 -- actually 16 through 19, that this is new authority, newly enacted that went into effect September 1st of this year, and even you put that it was very probable that should TCEQ do this, litigation will likely ensue. Is that your belief?

A. After 34 years in this business, yes, that's my belief, that litigation will ensue if the TCEQ were to exercise this in any meaningful way.

Q. Let's go to the final part of your report, which was II-C, or -- this is the area of your report that you said essentially

are what you believe actions that TCEQ could take, and I think you said earlier when we first started that you may have a few more you want to add. So we'll get to that and I'll let you add those. But first let's go through these.

A. All right.

Q. "Temporarily suspend or adjust water rights." You'd agree that currently TCEQ temporarily suspends and adjusts water rights in certain situations?

A. Yes, sir.

Q. Okay. "Not issue new term permits and suspend such authorizations." Meaning I guess suspend such authorizations of certain term permits in times of shortage?

A. Yes, sir. They do that when they determine that there's not enough water in the basin.

Q. Okay. You also say that one of the things they can do is cancel unused water rights. First of all, there have been instances, and I'm assuming there were some while you were at TCEQ, where TCEQ went through the cancellation process?

A. It's, it's so rare, I can't give you a cite of one. I think I can recall one instance in my career where there's been a cancellation.

Q. Okay. Well, you know at least they've done it.

A. Yes.

Q. At least you believe it is done very rarely.

A. Oh, absolutely.

Q. Is that fair? Okay. And you, under C4, you actually break that down a little bit and you say, "Evaluate certain other areas in order to manage and protect water rights and uses during shortages." And you address 4A there, under Impoundments. Actually, you use impoundments, surplus water return flows, and that's consistent with the discussion we had on return flows a moment ago?

A. Yes.

Q. Okay. And then also you address exempt uses. Now, I want to make sure we're talking about the same thing, and that's on Page 17 and 18 of your report, on exempt uses, are you talking about D&L uses?

A. Yeah, there are numerous -- not numerous -- there are a number of exempt uses in the Water Code. But the lion's share of exempt uses is domestic and livestock.

Q. So pretty much on that section, you were pretty much meaning the D&L users.

A. Absolutely.

Q. And it's your recommendation there that something that TCEQ could do would be to inventory those uses. And that's what you addressed a little bit with Mr. Blackburn?

A. Yes.

THE COURT: Who's beeping?

MR. WILLIS: I'm sorry.

THE COURT: Does anybody know who that was?

MR. WILLIS: I'm sorry?

THE COURT: Somebody's watch was beeping. Who was it?

MR. WILLIS: I can't hear it. I can't hear high pitch sounds.

THE COURT: The CSO in the back?

COURT SECURITY OFFICER: Yes, ma'am.

THE COURT: What was that?

COURT SECURITY OFFICER: I just hit my watch inadvertently, ma'am.

THE COURT: Okay. You can give that to the clerk. Okay? Thank you. Go ahead. Thank you.

MR. WILLIS: Thank you.

BY MR. WILLIS:

Q. And I'm curious, you say there's no inventory of D&L users.

A. Correct.

Q. And that's not just the users but the amount they use. Correct?

A. Correct.

Q. On Page 18, line 5 and 6 of your report, you say, "These exempt uses could represent significant amounts of water." Do you really have anything to base it on that you believe that it could represent a significant amount of water?

A. Here's what I base that on, Mr. Willis, the fact that a

domestic and livestock use can be in place for any landowner adjacent to a stream, no matter what size property they have, whether it's, you know, one foot adjacent to the stream, or whether it's 100 acres.

Given that general proposition of which domestic and livestock attaches, it could be very significant, in especially a large river basin. Significant also in the extent that no matter what size their property is, as we, as the witnesses earlier this morning talked about, there's no restriction at all on what can be pumped by a domestic and livestock user, as long as they qualify. And the 200 acre limitation on the impoundment is one of storage on an annual average, and not 200 acre feet total.

So given, given the fact that there is no limitation on the amount that can be pumped, and given the potential of a significant number of domestic and livestock uses along a river segment was the basis for my statement that that could be a considerable amount of water. We don't know --

Q. Okay, that's fair.

A. -- in any given basin. We don't know.

Q. That's fair. We're not sure. You believe it is, based on what you've just said.

A. I said it could be.

Q. Could be. Fair enough. And I finished with the outline as far as those other areas, but you said that there may be

some more you wanted to add, under the creative ways to find water to get to the bay is the way Mr. Blackburn, in his direct, referred to it.

A. Yes.

Q. Tell me, any other ways that you would like the Court to consider.

A. Well --

Q. Any other -- I'm sorry, when I say "ways," any other avenues of things that TCEQ might could do.

A. Well, you heard a little bit this morning, I think from Mr. Vickery, about supplemental environmental projects.

Q. I'd like to ask you about that. You're familiar with the supplemental environmental project.

A. Very well.

Q. The legislation -- let me rephrase that. Legislative authority has already been passed for TCEQ to be involved with the supplemental environmental project.

A. Yes, it's firmly in place.

Q. Okay. That could be used, for example, as an avenue to possibly purchase habitat for endangered species.

A. It could be.

Q. Anything else?

A. Well --

Q. I'm sorry, I interrupted on the --

A. Well, but on the other side of that, on the supplemental

environmental project, what I was thinking more of not just buying habitat, but especially in regards to the whooping crane, or other endangered species in a bay and estuary, supplemental environmental projects could be used to provide funding to buy unused water rights that would be dedicated for instream flows and flows into the bays and estuaries.

Q. You know, I appreciate that, and I'll just ask this, since the Court brought it up earlier. Have you given an opinion or have you formulated an opinion, I should say, regarding any potential costs associated with that recommendation?

A. Well, there would be costs only to the extent that a enforcement respondent was paying part of the penalty that they would have otherwise paid into the Treasury of the State of Texas, into a supplemental environmental project that would, you know, purchase water rights.

So to me, there's not a cost, because they were going to pay it anyway to the State of Texas for violating the laws.

Q. Okay. Any other --

THE COURT: You mean purchase the rights of existing owners?

THE WITNESS: They could, they could purchase water rights from existing water rights holders and have those water rights then dedicated for instream uses, environmental uses or flows to the bays and estuaries. Put it in the, what's called the Texas Water Trust.

BY MR. WILLIS:

Q. I was going to ask you about the Texas Water Trust. But essentially you would see that almost in conjunction with use of a step -- a SEP. I'm sorry.

A. It could be.

Q. Okay.

A. I mean, the discussions about the SEP, to me, I didn't think so much as buying habitat, as in this regard, in this case, as buying water --

THE COURT: The water.

THE WITNESS: -- that's not being used that could be dedicated for the purposes of flowing into the bays and estuaries.

BY MR. WILLIS:

Q. That's fair, but you've been in here a few days and heard some testimony. Would you agree that potentially buying habitat is another option, another thing that could certainly help?

THE COURT: Well, buying habitat is not going to help if it's still along, it's going to be the same way, and it will be all high salinity. So what can help --

MR. WILLIS: I'm not the salinity expert. I can't address -- I'm sorry, Your Honor.

THE COURT: I'm just listening to what the other, the salt people say. So if that's not an option, how, how much

water could you buy to get 1½ million --

MR. WILLIS: That's why, again, I posed that question to Mr. Soward, that if that recommendation is being offered, then I wonder if anybody has given a, not just a funding but a cost idea on that.

THE COURT: How much it would cost, and if you use the SEP fines, how much does water sell for? For the people who buy it and resell it, right?

MR. WILLIS: Blackburn gave me a bottle for free a while ago, so I don't know how much it sells for.

THE COURT: There you go. Let's have Blackburn find it then.

MR. BLACKBURN: I'll be happy to, Your Honor.

THE WITNESS: Your Honor, the cost would just depend on who they're buying it from.

THE COURT: How much does water cost?

THE WITNESS: Well, it varies. And I'm not trying to be vague. It just varies --

THE COURT: Used water. Right? It would be used water?

THE WITNESS: Well, no, it could be -- it could be unused water, under a water right out of storage of a reservoir, like you could buy from a river authority. You know, it depends on the going rate, but you know, $100, 150, 200. It just depends.

THE COURT: For an acre --
THE WITNESS: Acre foot.
THE COURT: Acre foot.
THE WITNESS: Remember, that's 320 --
THE COURT: Have you got any water for sale, your clients, Mr. Fernandes?
MR. FERNANDES: Kathy? I'm assuming it would --
THE COURT: Ms. Robb, any water for sale?
MS. ROBB: I can check.
THE COURT: How many SEP fines do you get a year?
THE WITNESS: It's, statewide it's probably several million.
BY MR. WILLIS:
Q. Not several million funds. You're saying several million dollars?
A. Dollars. Dollars.
Q. Out of SEP funds.
A. I'm sorry. You've got several million dollars that's dedicated to different SEPs. Your Honor, most of them --
THE COURT: Are those already spoken for?
THE WITNESS: So far they are.
MR. WILLIS: They're usually, when they're set up --
THE WITNESS: Yeah.
MR. WILLIS: -- they're set up for a particular purpose.

THE WITNESS: Yeah, what happens, Your Honor, is when a respondent is settling an enforcement case with the TCEQ --

THE COURT: Right.

THE WITNESS: -- the fine is determined, and they agree to pay part of that fine to a SEP, a specific SEP.

THE COURT: So if you created a SEP for the bays and estuaries of the San Antonio River and the Guadalupe basin, how much could it take to get ideally 1½ million, or a million even?

MR. WILLIS: Your Honor, I guess my request would be that different witnesses have, might could address that for you. I think that's a fair question.

THE COURT: I understand that, but I'm just wondering, let's just do a little survey, you know, while we've got a few days and see what water's for sale, how much it costs and whether it's feasible. That sounds like something nice to do, without all this litigation.

MR. WILLIS: I agree. You want me to go forward?

THE COURT: Oh, absolutely.

MR. WILLIS: I'm just about done.

THE COURT: I don't think we've found a solution.

THE WITNESS: Could I give you one more option? I mean --

BY MR. WILLIS:

Q. Sure. No, I'm sorry, I thought you were done. Any other

options you think of?

A. No, I mean, I'm not going to belabor the point because I could spend hours talking about possible options. But one, one other significant one that comes to my mind that I didn't include in my report, and it was just because I was, failed to be as creative as I should, as Mr. Blackburn would say. I think that in times of emergency, which is basically the drought, that the TCEQ could suspend new water sales contracts that, under existing water rights, in that period of time. And then re-institute or re-allow that process once we get past that.

And the basis I'm saying that is we have a lot of water in the state, in almost all the basins, that even though the basin may be at appropriation or above appropriated levels, as we already have seen, the actual use is much lower. So there's a lot of water in the basins that are appropriated -- I mean, are under a water right but are not being actually used.

THE COURT: Well then, I don't see how that would help the bays and estuaries.

THE WITNESS: How that would help --

THE COURT: Because it's not being used.

THE WITNESS: How that would help --

THE COURT: So the straw's not coming, the water's not being sucked out.

MR. WILLIS: That's right.

THE WITNESS: It would --

BY MR. WILLIS:

Q. It wouldn't add any extra water, is what I guess the Judge is asking.

A. It would prevent it from being further reduced.

THE COURT: Okay. But we're not trying to look at further reduction. The problem is how do you get fresh water there now to balance the ecosystem that is, obviously these ecosystems in the wetlands are very fragile.

THE WITNESS: Your Honor, it's only in the context --

THE COURT: It's not just a bunch of bandages and stuff, I mean.

MR. WILLIS: But I promised Mr. Soward I wouldn't argue with any of his positions. I just wanted to know exactly what they were.

THE COURT: I get to do it.

THE WITNESS: I understand. And I offer that only in context of the witness that showed you the three scenarios.

THE COURT: Exactly.

THE WITNESS: And when he ran the simulation that showed that if all water rights were used to their maximum authorization, the effects that that would have.

THE COURT: We're in serious trouble.

THE WITNESS: And I'm just saying to the extent you can, in times of an emergency, prevent further use of water

from that currently existing, then that will help avoid even a worse situation.

THE COURT: Got it.

BY MR. WILLIS:

Q. Anything else on that section that you want to add, as far as potential other avenues?

A. I think we've covered a number of innovative ideas.

MR. WILLIS: Could I get the ELMO again just briefly?

THE COURT: So do you think that's possible to look around and see how much water costs and see if we could set up a SEP fund for that?

MR. WILLIS: I think if that's what Your Honor has just indicated, I'll certainly --

THE COURT: I mean, it seems to me the most realistic possibility.

MR. WILLIS: I think it's certainly a possibility, Your Honor.

THE COURT: And not for me to spend the next 20 years, which I probably don't have on the bench, overseeing some massive restructuring of xeriscape gardens, sorry, Mr. Blackburn, and try to come up with my own, it would be my own idea of what I think is fair. And sometimes I don't think that's fair at all, one person doing that.

MR. WILLIS: Your Honor, I know while standing here without looking behind me at this table, I know that it would

be something that the State could, would consider as far as a Supplemental Environmental Project. As to specifically dedicated for purchasing water rights, I have no idea how to answer that, and I'd like to have the opportunity to be able to --

THE COURT: Well, we have some time to figure that out.

MR. WILLIS: Okay.

THE COURT: In the meantime, we'll continue on with the case. I don't mean to stop it. But it seems like all of us, with the same idea in mind, to make sure that everybody has enough water to live and survive and that we don't in any way endanger an already endangered species further, that we might be able to come up with something --

MR. WILLIS: I think --

THE COURT: -- without being so at odds. Because everybody here has such a good purpose. So, there we go.

MR. WILLIS: If I can get the ELMO again just briefly, or the lights.

THE COURT: Are you on it? Oh.

MR. WILLIS: Yes.

THE COURT: Sorry to turn it off.

BY MR. WILLIS:

Q. Finally, under your conclusion, Mr. Soward, if I read it correctly, in your opinion, "If an HCP is ordered as a form of

relief, the TCEQ has a number of options detailed above available under its existing legal authority for managing State-owned surface water during times of water shortage." Correct?

A. That's my statement.

Q. Okay. I read it correctly. But, and what I'm trying, what I'm going to ask you here is it's your opinion that the, all the number of options that you say you detailed above in your report, that it's your opinion that they're already available under the current existing legal authority of the TCEQ to do that. Correct?

A. They are, if the TCEQ was inclined to utilize that authority.

Q. But if the authority is already there, in your opinion, for TCEQ, then an HCP is not even needed, because if the authority already exists, you're saying they could do it without an HCP.

A. They could do it, but they haven't done it.

MR. WILLIS: I'll pass the witness, Your Honor.

THE COURT: Thank you. Anything further, Mr. Blackburn?

MR. BLACKBURN: Yes, Your Honor.

THE COURT: Okay.

(Counsel conferring off the record.)

THE COURT: I like your ideas.

THE WITNESS: Thank you, Your Honor.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q. Now, we seem to be getting to the nub of the issue of this. Creative solutions. Are you familiar with a concept called Natural Resource Damage Assessment? Does that mean anything to you?

A. I've heard the term, but I have no personal experience with it.

Q. Then perhaps I should talk with someone else about that.

A. Yes, sir, they would be more knowledgeable.

Q. Now, in terms of trying to move forward, and sort of picking up a little bit on what the Judge was suggesting, would it be fair to say that if we kind of break the problem into an existing problem that the whooping cranes are facing and the prospect of it getting worse, that there are distinct things that could be done separately to address the problems of it getting worse than from sort of taking the existing system and working toward making that better?

A. Yes.

Q. And some of the solutions that you've talked about would be to impose conditions to keep things from getting worse. Is that fair?

A. Getting worse in times of emergency.

Q. And "emergency" in this context --

A. Drought.
Q. -- being drought. And so, you know, and then to take an existing situation and say, "cancellation of unused portion," things like that, that would keep the situation from getting worse. Curtailments, some concept of a roll back or something like that, would be an attempt to make some water available more than what would be available otherwise?
A. Correct.
Q. And have you, have you ever seen a process at TCEQ where essentially all of these different concepts would be put together to try to see what exactly they could achieve?
A. No.
Q. Now, are you familiar with the purpose of a Habitat Conservation Plan?
A. Yes.
Q. Is it your understanding it is to essentially, among other things, provide insulation for penalties for a take?
A. That, I have a very general understanding for that, yes.
MR. BLACKBURN: And Your Honor, we will have a witness coming that can talk in more detail about that aspect as well.
BY MR. BLACKBURN:
Q. Let me ask you this. If the holder of a water right is a subdivision of the State of Texas, is there anything, sort of any additional authority or power of the TCEQ under the water

rights concepts to address a State permit holder, or a permit holder who is in fact an entity of the State?

A. As far as the TCEQ is concerned, I wouldn't say so, because as a permit holder, or a holder of a certificate of adjudication, a State entity is basically the same as an individual or a company or an industry or a farmer or a city, if they are a water rights holder. So as far as the TCEQ's concerned, I don't, I don't necessarily think that they could take any special action with regard to a State entity, differently than they could anyone else.

They, certainly in the brotherhood of State agencies, they might try to get more informal or voluntary actions and results.

Q. Would you consider that the Endangered Species Act itself, the federal act, gives the additional authority to the TCEQ under its enabling provisions, under TCEQ's enabling provisions?

A. Yes, back the other direction, I think the general authority that we have already talked about with Mr. Willis under 5.102 talks about other laws, and I think certainly the TCEQ -- excuse me -- the Endangered Species Act is an "other law" that the TCEQ is charged to implement, if will you.

Q. And finally, let me ask, with regard to creative concepts for the bays and estuaries, are you familiar with the permit application that the San Marcos River Foundation made to

appropriate water for the San Antonio Bay system under TCEQ provisions?

A. Yes. It was affectionately called the SMRF application.

Q. And what happened to the SMRF application?

A. It eventually was dismissed because the legislature initially directed the agency not to process any of those while they considered legislation. And then when Senate Bill 3 was passed in 2007, there was express legislative prohibition to issue any permit for the purposes of providing environmental flows or flows to the bays and estuaries. So it made a SMRF application impermissible.

Q. So that's why we're having this discussion about other ways?

A. Yes. When Your Honor, I believe yesterday, asked why can't the whooping cranes get a permit, the legislature has said you cannot do that.

THE COURT: State legislature?

THE WITNESS: Texas Legislature.

THE COURT: And why? Is that right?

THE WITNESS: Why?

THE COURT: Why?

THE WITNESS: Um --

MR. WILLIS: Your Honor, I'd rather put a witness on the stand to address --

THE COURT: Thanks.

MR. WILLIS: -- both that specific application and the reasoning behind what happened, rather than me attempt, again, to try to give you my version of it.

THE COURT: Are there federal funds available to purchase water?

MR. BLACKBURN: There may be, Your Honor.

THE COURT: I'm just saying what if, what if the State agreed to have all new water permit applications that went down to San Antonio River and the Guadalupe River with the right that they had to put it back in, or if they wanted to sell, they had to give the first right of refusal to whatever project this would be to buy the water to bring it to the bays and estuaries?

MR. BLACKBURN: May I make a bold suggestion? There is a Natural Resource Damage Assessment that is about to be assessed against one or more parties regarding the oil spill in the Gulf of Mexico.

THE COURT: Surprise, surprise.

MR. BLACKBURN: Surprise, surprise. There's likely to be billions, not millions, but --

THE COURT: I figured it would take 15 billion a year to do this --

MR. BLACKBURN: It may not cost --

THE COURT: -- if it's $100 an acre.

MR. BLACKBURN: But it could take hundreds of

millions.

THE COURT: Of course, I'm not good with all those zeros, so maybe it's more than that.

MR. BLACKBURN: I mean, you know, let's start with 100 million or perhaps even half a billion.

THE COURT: Well, if you take, if you just get 750 million, it would be fantastic.

MR. BLACKBURN: Well, I would tell you if we could get 200,000 at the key time, it would be important and fantastic, along with curtailment of the full use of the existing permits, with restrictions on return flows to make them come back.

THE COURT: Well, that's what we're -- you know, I'd like to hear from the State, from all their experts about what is feasible, what actually can be done, without some, one person sitting here -- and I'll do what I have to do. I have no problem with that. I think my record shows that I don't have any problem with that. But it just seems somehow inappropriate for one person sitting up here telling the whole State of Texas what they're supposed to be doing with their water.

It seems to me much more beneficial if we can find out a way to come up with some something or other, a funding mechanism where you can take the SEP funds, or the SEP funds can be one part, you can get funds from the BP accident, if the

Harte Institute will help you, and start buying water and see -- and then the State could say, for any water rights that we're going to give you, all, if you intend to resell them, then the first, right of first refusal -- what do you think, Mr. Willis? I'm not asking you to commit.

MR. WILLIS: No, I was --

THE COURT: But I'm asking you to think, first right -- right of first refusal to buy would go to this whatever entity to buy the water, for those permitted holders on the Guadalupe and San Antonio Rivers.

MR. WILLIS: In all fairness, Your Honor, I certainly think that all parties would consider looking at different things.

THE COURT: Any solution.

MR. WILLIS: But let me just urge that the Court seems to be, and understandably so, focusing on water right now. And I think that before the Defense case is closed, that it might not be just water.

THE COURT: It's not fair for me to -- it's not fair for me to talk about this before I hear the Defense case. But I'm just, there are things I'm just thinking about. I'm just thinking about, it seems like there ought to be some solution, if we all sat down and thought about it a while. I know you all have forever and eve. But when you get sued, it puts you in a different posture than when you're trying to just figure

out what's, what may be -- and when you're suing people, you get your back up, too. So I'm just thinking if we could maybe sit down sometime and, after we've heard the case, and come back together and see what's what.

MR. BLACKBURN: We would certainly welcome the opportunity to pursue anything along those lines. And I would just say Your Honor's presence, either in those discussions or causing those discussions to take place, I think, is an absolutely necessary element.

THE COURT: I have no problem with doing that, for as many years as it takes. And I'll tell you all, it's obvious that my heart's with the whooping cranes, but my head's going to be in the law and firmly affixed thereto. And what's reasonable, fine; what's not reasonable and what's beyond my discretion, I'm not going to go there. I don't know what that is yet, because I'm not, still not sure what's being asked. But I've got a feeling that it's not something that may happen in the long run.

MR. BLACKBURN: Well --

THE COURT: And maybe it's something that nobody's going to like. And that's bad, you know.

MR. BLACKBURN: Well we, you know, we all I think learn through this process, too, Your Honor.

THE COURT: It's very interesting. And I'm very anxious to hear the Defense witnesses as well. I have some

indication of what they're going to say, from the cross-examination, which is not always 100 percent fair, but it gives me a clue. And I can surmise where we're all going. So that's what I'd like us to think about, if possible. I think we ought to -- are you finished with this witness?

MR. BLACKBURN: I am, Your Honor.

THE COURT: You think we ought to call it a day?

MR. WILLIS: Thank you, Mr. Soward. I've got nothing further.

THE COURT: These days are just getting longer and longer. Oh, Ms. Snapka, did you want to cross?

MS. SNAPKA: I do not, Your Honor.

THE COURT: Okay. And I'm sorry, Ms. Snapka, if it feels -- I'm trying to spare Mr. Coover, because he's an old friend, too, and everybody knows Ms. Snapka's an old friend of mine. It's hard when you have an old friend come into court and try to be fair and objective, and then I think, I think I'm picking on Ms. Snapka. So it can have a reverse effect for a great lawyer that's friends of mine. So I just want to say that.

Anything else to take up before we come back?

MR. BLACKBURN: What, 8:30 in the morning?

THE COURT: 8:30. Thank you all. Yes, sir.

THE WITNESS: Your Honor, am I excused?

THE COURT: Is he -- is Mr. Soward excused

permanently?

MR. BLACKBURN: He is by me.

MR. WILLIS: Fine, Your Honor.

THE COURT: Thank you very much.

THE WITNESS: Thank you, Your Honor.

(Proceedings concluded at 5:38 p.m.)

I, court approved transcriber, certify that the foregoing is a correct transcript from the official electronic sound recording of the proceedings in the above-entitled matter.

/s/ Molly Carter
Molly Carter

January 27, 2012
Date

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	)	CASE NO: CA-C-10-075
	)	
Plaintiff,	)	CIVIL
	)	
vs.	)	Corpus Christi, Texas
	)	
BRYAN SHAW, ET AL,	)	Friday, December 9, 2011
	)	(8:33 a.m. to 9:54 a.m.)
Defendants.	)	(10:09 a.m. to 12:05 p.m.)
		(1:47 p.m. to 3:10 p.m.)
		(3:45 p.m. to 5:00 p.m.)

BENCH TRIAL - DAY 5

BEFORE THE HONORABLE JANIS GRAHAM JACK,
UNITED STATES DISTRICT JUDGE

Appearances:	See next page
Court Recorder:	Velma Gano
Courtroom Clerk:	Lori Cayce
Transcribed by:	Exceptional Reporting Services, Inc. P.O. Box 18668 Corpus Christi, TX 78480-8668 361 949-2988

Proceedings recorded by electronic sound recording;
transcript produced by transcription service.

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Corpus Christi, Texas; Friday, December 9, 2011; 8:33 a.m.

(Call to Order)

THE MARSHAL: All rise.

THE COURT: You may be seated.

(Pause; Court confers with Clerk)

You all can be seated, please.

Have you-all settled everything now?

MR. BLACKBURN: We've been inspired, your Honor, but we're not quite there.

THE COURT: Thank you.

Next witness.

MR. BLACKBURN: I'd like to call Andrew Sansom, please.

(Pause)

ANDREW SANSOM, PLAINTIFF'S WITNESS, SWORN

THE CLERK: Please have a seat. Please watch your step.

THE COURT: Good morning.

THE WITNESS: Good morning, your Honor.

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q Would you introduce yourself to Judge Jack, please? In a second -- there you go --

A Your Honor, my --

Q -- now that you can see.

A Your Honor, my name is Andrew Sansom. It's spelled S-a-n-s-o-m.
Q And Mr. Sansom, where do you currently live?
A I live in Austin, Texas.
Q And how are you currently employed?
A I am a research professor and executive director of the River Systems Institute at Texas State University, San Marcos.
Q And we have a --

MR. BLACKBURN: What's the exhibit, please?

THE COURT: Don't touch the microphone, please.

MR. BLACKBURN: Yeah, those microphones are very sensitive. We've seen someone jump down here on occasion, so…. 259?

BY MR. BLACKBURN:

Q You've provided us with a resume that's Exhibit 259. To the best of your knowledge is that a true and correct copy?
A It is.
Q And what I'd like to do is just kind of talk you through it and not actually read it. Could you start off by telling us a bit about your educational background, please?
A Yes, sir, I have a degree from Texas Tech University in parks and recreation administration and I'm completing a dissertation for a Ph.D. in geography from Texas State University.
Q You're getting educated in your old age?

A I'm going to school.
Q And could you tell us a little bit about your work and employment background going back, I guess, to when you got out of school?
A Well, I left Lubbock, Texas and went to Washington, D.C., where I became a special assistant to the Secretary of the Interior, which is where I first began to be involved in whooping crane conservation. I came back to Texas in 1976, worked for a while at the University of Houston and then became the second executive director of the Texas Nature Conservancy. During that period I managed to acquire the remaining 13,000 acres of whooping crane habitat on Matagorda Island, which was transferred to the U.S. Fish and Wildlife Service.
Q So you were responsible for essentially the purchase or of obtaining the land that is now part of the refuge called Matagorda National Wildlife Refuge, which is whooping crane habitat?
A Yes, sir.
Q And when did that happen?
A 1986.
Q And if you could -- if you'd -- after you left the Nature Conservancy.
A Yes, sir. I went to work at the Texas Parks and Wildlife Department as the director of land acquisition and management and developed the master plan for the management of Matagorda

Island in cooperation with the General Land Office and the U.S. Fish and Wildlife Service.

Q So you went from buying and setting aside the land to coming up with a management plan for portions of the wildlife refuge?

A Yes, sir. And then in 1990, August of 1990 I was appointed executive director of Parks and Wildlife, a position in which I served for almost 12 years, and during that time I had management responsibility for Matagorda Island as part of the refuge system in the Texas wildlife management area.

Q And as executive director of Parks and Wildlife as a general proposition did you have responsibilities for endangered species in the state of Texas?

A Yes, sir.

Q Now, after you left Texas Parks and Wildlife what did you next do?

A Well, I retired for about a month then I went to work at Texas State University to create the River Systems Institute there. During the ten years that I've been there the Institute has responsibility for the management of the San Marcos Springs, which are home to eight federally-listed endangered or threatened species. We manage a extensive program of research on rivers and streams throughout the state, principally concerned with environmental flows, we still manage a aquatic environmental education program there which reaches about

125,000 people a year, and we monitor water quality in rivers and streams throughout the state.

Q So would it be fair to say that going back really almost, I guess, back to, what '73 when you went to the Interior Department, from then on off and on you've been involved with endangered species management throughout your whole career?

A Yes, sir.

Q Now, I want to ask you a little bit about awards. I know that this is not something that you particularly want me to ask you about, but could you identify some of the awards that you have received for conservation efforts over the years?

A Yes, sir. I received in the late 1980s the Chevron Conservation Award. I've been granted the Cornelius Amory Pugsley Medal from the National Fish and -- Parks Foundation, the Chuck Yeager Award from the National Fish and Wildlife Foundation, and the Ernest Thompson Seton Award from the International Association of Fish and Wildlife Agencies. I've received a lifetime achievement award from the Nature Conservancy.

Q Now, have you written any publications?

A Yes, sir, I've published articles in a number of magazines, including Texas Monthly, Texas Observer, Texas Highways, Texas Parks and Wildlife, Cowboys and Indians and others, and I've published six books.

Q And what are the names of your six books, if you can

remember them? I've got two written down in case we need help.
A *Texas Lost*, *Texas Past*, *Water in Texas*, which is an introduction to water issues in our state, a book about a dog called *Scout, the Christmas Dog*, and a book that's out today called *The Southern Plains Bison*, which is about buffalo in Texas.
Q And with regard to your book *Water in Texas*, would tell me a little bit more about that book?
A It's basically an introduction to water in the state. It's published by the University of Texas Press. It talks about both the scientific and policy issues of water across the state and it's used as a textbook in many university classes.
Q And with regard to your current involvement with non-profit organizations, could you identify any boards of directors that you're on?
A Yes, sir, I serve as a member of the Advisory Board of the Hart Institute for Research in the Gulf of Mexico, I'm the chairman of the support group for the Hart Institute, I served for almost a decade on the Board of the National Audubon Society, and I'm a member of the Board of the Jacob and Terese Hershey Foundation.
Q And with regard to creative solutions, would it be fair to say that over your career you have been involved in developing creative concepts for protecting natural habitats?
A I had to, particularly during most of my tenure in public

service financing and funding has always been a problem and so it's required creative solutions. During the time at Parks and Wildlife that I served as the executive director we created the Texas Coastal Birding Trail, which caused not only a lot of economic activity related to nature tourism, but also additional amounts of protection along the Texas coast. When I worked for the Nature Conservancy I managed to acquire about 25 or 30 parcels from the old Sun Oil Company, which over a period of years we traded to the Cullen family of Houston to create the preserve at Matagorda peninsula. So I've been involved in a number of different transactions and programs to try to get outside the box, if you will, to accomplish conservation in our state, particularly in the time of fiscal tightness.

Q So would you be of the opinion that with a little creativity there's some amazing things that can be accomplished?

A Well, and that's the only way that amazing things get accomplished today. And we have tremendous opportunity to do that.

Q And for example, were you involved in Big Bend Ranch?

A Yes, sir. I had the great privilege of acquiring Big Bend Ranch for the State of Texas. It took almost 11 years of work, but it is the third largest state part in the United States, about 320,000 acres.

Q Would it be fair to say that not only do you think creative, but you think big?

(Laughter)

A I think you have to.

Q So you're not shy about --

A Texas is a big state.

Q But you're not shy about taking on big problems?

A No, sir.

MR. BLACKBURN: I offer Andy Sansom as an expert in water management, environmental management policies.

THE COURT: Ms. Robb?

MS. ROBB: No objection, your Honor.

THE COURT: He's accepted. Thank you.

BY MR. BLACKBURN:

Q Now, I want to start off by talking a bit about the -- just in general some of the challenges of endangered species. Have you been involved over your career, specifically in Texas and specifically with water, on some of the issues and difficulties of endangered species?

A Yes, sir.

Q And did you come to be involved in the litigation surrounding the Edwards Aquifer?

A Well, only as a -- in my role as the executive director of Parks and Wildlife and having responsibility for endangered species in Texas and then later as the steward of one of the

principal sites in that issue, which is the San Marcos Springs.
Q Now, tell me a little bit about the San Marcos Springs. You've been hired to come over to the Texas River Institute and I've had occasion to visit your offices and you're in, what, the old hotel at Aquarena Springs?
A Yes, sir, I work in the honeymoon suite of what was known for many years as the Aquarena Springs Inn. It was built in 1929. Interestingly enough, it was restored, your Honor, in a partnership with Texas Parks and Wildlife, which resulted in the dedication of over 40,000 acre-feet of water dedicated to environmental flows in the San Marcos River. The spring is the second largest artesian spring in the western United States. It's home to eight federally-listed endangered or threatened species. It is quite possibly the oldest, certainly one of the oldest, continuously inhabited sites by human beings in North America and for almost a generation it was the largest commercial tourist destination in Texas.
Q And do you still bring tourists into the springs?
A Yes, sir, we do, about 125,000 visitors a year, although, your Honor, most of those are now school children who come in buses for organized field trips.
Q And what are the types of endangered species that are in the springs? Could you give us a couple of ideas?
A There's a couple of little fish, a couple of salamanders, and indigenous wild rice that occurs only in that location, and

then a number of invertebrates.
Q And is San Marcos Springs one of the springs that was at the heart of the Edwards Aquifer litigation?
A Yes, sir.
Q Now, by the time you got to the River Institute the litigation was sort of in the past, was it not?
A That's correct.
Q And did you come to be involved in something called a Recovery Implementation Plan for the Edwards Aquifer?
A Yes, sir. The original litigation involving the Edwards required that the Fish and Wildlife Service prepare a habitat conservation plan which placed pumping caps on the Edwards. In addition, the State Legislature set up the Edwards Aquifer Authority to begin regulation of the Aquifer and achieve those pumping caps. By the time I reached Texas State University it had become apparent that that pumping level was not feasible to be reached and so the State Legislature in Senate Bill 3, which we have discussed here, allowed for the pumping caps to be raised, but also required that a habitat -- that a recovery implementation program be instituted to both protect the human uses and economic uses of the Edwards but also protect the endangered species.
Q So when you got involved Fish and Wildlife Service had been ordered to prepare a habitat conservation plan. So that HCP process was underway under Court Order?

A Yes, sir.
Q And there were pumping caps which would be limits on the total amount of water that could be used, is that right?
A Yes, sir.
Q What did everybody think about that?
A Well, once the Edwards Aquifer Authority determined the amount of historic use of the aquifer it was determined that those pumping levels could simply not be reached and so an alternative plan had to be developed that would both protect the economic activity in the region but also protect the species.
Q You've heard a little bit of the evidence in this courtroom, it sounds a bit like what we're talking about here?
A Yes, sir, and I believe it has application here.
Q Now, we have an HCP required under Court Order, the Fish and Wildlife Service has moved to develop it, Texas Legislature sees a possible impasse and so the Legislature does something in Senate Bill 3. What did they do?
A They authorized the participation and mandated that certain State agencies allow for other entities to voluntarily participate in a recovery implementation program which both ensured the protection of the species, preserved the State's role in management of water resources, and allowed for economic activity to continue in the region.
Q Now, you --

A The process was both stakeholder and scientifically based.
Q So it was a process to bring in essentially all of the players that both had scientific knowledge and information and that would be affected one way or the other by this activity?
A Yes, sir.
Q Now, Senate Bill 3, the process that started -- the act that set this in motion, as well as some of the bay and estuarine stuff, were you involved in those negotiations?
A Yes, sir.
Q Would Senate Bill 3 ever have passed, in your opinion, without the HCP having been ordered by the Court?
A Well, the component that authorized and mandated the Recovery Implementation Program I do not believe would have ever passed without the continuing threat of federal intervention in the aquifer.
Q And one --
A I should say the specter of federal intervention, not the threat.

THE COURT: I'm just a specter.

(Laughter)

THE WITNESS: I thought that was a better term.

MR. BLACKBURN: He's a little worried about being politically correct here, so….

THE COURT: Don't worry about it. I don't think he's too concerned.

MR. BLACKBURN: He's not.

BY MR. BLACKBURN:

Q What did you think of this process when it was first put underway? I mean --

A Well, I participated in the early discussions as to whether or not the RIP should be instituted. I hosted the original discussions at our offices in San Marcos and participated in the legislative discussions. And I was a skeptic, I just couldn't imagine that you could really bring these diverse parties together with the tremendous pressures on the aquifer, the complications of meeting the requirements of the Act, and so I have to say I was pretty skeptical.

Q So how did you get started?

A Well, you know, once again with the hammer of potential federal involvement hanging over the participants the Legislature established a timeline with specific goals, specific times to meet those goals, specific outcomes, and a timeline for completion of the whole process. And, in fact, it has been successful. We will -- many of us in the room will gather in San Antonio next week to sign implementing agreements to cause it to go into effect.

Q Now --

THE COURT: So was that satisfactory, I don't need to do anything more?

MR. BLACKBURN: You don't need to do anything more

for that one.

THE COURT: I meant -- I thought SB3 had to do with everything, that's what --

MR. BLACKBURN: No, no, no, no, no. This is SB3 with a very limited application.

THE COURT: So as to the Edwards Aquifer only?

MR. BLACKBURN: Only for the Edwards Aquifer.

THE COURT: Oh.

MR. BLACKBURN: SB3 for the coast, we've been disparaging.

THE COURT: Well, that's what I thought.

MR. BLACKBURN: That's correct. SB3 for the aquifer is good. So they had different provisions for different things. The coast got the short end of the stick in --

THE COURT: So what's in it for us in SB3?

THE WITNESS: I beg your pardon?

THE COURT: What's in it for the coast here for SB3?

THE WITNESS: SB3, which many of us also were -- the provisions of SB3 which related to environmental flows, your Honor, which are both instream flows and inflows into our bays and estuaries, the provisions of the law which related to that subject matter created a stakeholder and science driven process river basin by river basin hopefully to recommend to the TCEQ environmental flow standards, which they would then consider and hopefully enact.

BY MR. BLACKBURN:

Q And to your mind has the environmental flow inflow portion of Senate Bill 3 been a success or a failure?

A Although I probably had more hope for this legislation than anything I've worked on in my career, I would have to say that the results have been very spotty and in the case of this particular river basin the stakeholders were unable to reach a consensus and in my mind that was a failure.

Q And do you have an opinion as to why they failed to reach a consensus?

A I don't think there were any adverse consequences to failure, such as --

Q So on the one hand you had a system set up on the aquifer where there were consequences to failure, is that right?

A Yes, sir.

Q And if we go to the bay and estuaries there were no consequences for failure and very different results?

A Right.

Q Now, do you think what happened in the aquifer portion could be used as an example of how to proceed to essentially resolve some of the issues with regard to the whooping crane?

A Absolutely.

Q And how do you see that experience in the aquifer being applied here? For example, when the Recovery Implementation Plan in the aquifer was being started how did it unfold?

A Well, it unfolded by the creation of certain subcommittees, one for science, one for a steering committee to drive the whole process, there were certain aspects of the Edwards Aquifer Recovery Implementation Program that were specific to the Edwards and so there were subcommittees set up for that, a subcommittee set up for funding to try to devise ways of funding the program, and once again, as I mentioned before, timelines and outcomes established for each and they were codified in the law.

Q Now, in terms of these timelines and outcomes, you didn't start the Recovery Implementation Plan for the Edwards knowing what to do, did you?

A No, sir.

Q So you essentially, both through HCP pressure and the Legislature, caused a process to take place that had consequences for failure, is that correct?

A Yes.

Q Now, for example money, how did you get money?

A Well, the original Senate Bill 3 did not provide for State legislative funding; however, the participants were able to contribute their own funds to the process and there was also funds that were provided through Section 6 of the Endangered Species Act, so there was federal funds from the U.S. Fish and Wildlife Service available.

Q And subsequently you had kind of somewhat creative funding

concepts being developed?
A Yes, sir. The ultimate cost of implementation of this program was thought to be about $30 million a year and that will be achieved by increased fees on pumping from the aquifer, which was agreed upon by all the participants.
Q So essentially a fee was assessed on the water users of the well water in the Edwards Aquifer and that was used to fund --
A That will be used.
Q That will be used. It hasn't happened yet?
A Right.
Q Is that what you're getting ready to sign tomorrow or the next day or whenever?
A Yes, sir.
Q Now, something like trigger levels, what's trigger levels?
A Well, trigger levels are when you get to a certain level of flow that would potentially put the species in jeopardy then it triggers certain kinds of actions to basically reduce water consumption. For example, landscape water and other things.
Q So landscape watering actually might have to be --
A I just used that as an example.
Q I've been hoping for this all along --
THE COURT: He's going to start a sideline --
(Laughter)
-- in landscaping, I think.

MR. BLACKBURN: I have a bunch, you know.

BY MR. BLACKBURN:

Q The trigger levels concept, how does it work in the aquifer? Do you have a general understanding of kind of what they are?

A Well, when the flows out of the springs at San Marcos and New Braunfels reach a certain level then that triggers certain kinds of management actions. I mean that's basically the way I would describe it

Q So you monitor some aspect of the natural environment --

A Right.

Q -- and then based on how those monitoring results come out --

A Right.

Q -- if you have regulatory things that have restrictions on usage begin to be applied, again sort of by agreement of all the parties, is that fair?

A Correct.

Q And so --

A After a lot of hard, hard discussion.

Q Right, this didn't happen like a snap of the fingers.

Now, who is chairman of the group?

THE COURT: Who is what?

MR. BLACKBURN: Chairman of the Recovery Implementation Plan.

THE WITNESS: The current chairman is, I believe, Mr. Tom Mimms, who's the general manager of the Nueces River Authority.

BY MR. BLACKBURN:

Q And they are not a participant in this. And --

THE COURT: Is that right?

MR. BLACKBURN: Their water basin does not come into the San Antonio Bay.

THE COURT: I know.

MR. BLACKBURN: It comes back around. You know that.

THE COURT: Well, I know, but then you have all those pipelines. I forget where they're coming in from.

MR. BLACKBURN: They come from actually further north up in the --

THE COURT: Okay.

MR. BLACKBURN: -- Matagorda Bay system.

BY MR. BLACKBURN:

Q With regard to the program manager, who's the program manager of the Edwards Aquifer?

A The program manager is a gentleman and an attorney named Mr. Robert Gulley, who is a lawyer in the Justice Department in Washington working on endangered species.

Q So basically --

A He now lives in San Antonio.

Q -- you found a specialist in endangered species, calls

that person to come in and actually run the day-to-day operations of this Recovery Implementation Plan process?

A And in my mind he has done a remarkable job.

Q Now, in your opinion has the Recovery Implementation Plan process been successful beyond your expectations?

A Yes, sir. The implementation is ahead of us, boots on the ground is set to begin in 2013, but in terms of the expectations of the process, the timelines and objectives that were set, I think it's been extraordinarily successful and has the promise of addressing this issue, which is equally complex as the one we are discussing here today.

THE COURT: So how much do you charge per acre of water?

THE WITNESS: It's a little bit different situation because the water is, you know, pumped out of the aquifer, and I actually do not know the exact --

THE COURT: Has anybody found out the going price for an acre-foot of water?

MR. BLACKBURN: It's 325,000 gallons, so it's probably more on a per gallon basis is what I would bet. I know that the TCEQ charges 40 cents per acre-foot.

THE COURT: Forty cents per acre-foot?

MR. BLACKBURN: For 325,000 gallons. Pretty cheap.

MS. ROBB: Your Honor, I'm being told that it's about 5,000 for groundwater.

MR. BLACKBURN: $5,000 an acre-foot of charge?

MR. MUNDY: For groundwater.

MR. BLACKBURN: For groundwater. So the Edwards charges $5,000 per acre-foot, river is 40 cents.

THE COURT: That's expensive aquifer. That can't be right.

MR. BLACKBURN: That's not right? I mean I can bring Mr. Soward back up if you'd like. He doesn't have a tie on, he tells me, but ...

THE COURT: I don't need to.

MR. BLACKBURN: But from the note I was passed -- I'm sorry.

MR. WILLIS: I just want to clarify something. TCEQ doesn't sell water.

MR. BLACKBURN: The State charges for it.

MR. WILLIS: We'll let another witness address this issue, your Honor.

MR. BLACKBURN: I'll bring Mr. Soward back up just for that question. I think --

THE WITNESS: I'll loan him my tie.

THE COURT: Pardon me?

THE WITNESS: I'll loan him my tie.

THE COURT: Okay.

MR. BLACKBURN: Just go ahead and step on down.

(Laughter)

BY MR. BLACKBURN:

Q Charging is a process -- well, would you describe how full cost pricing may fit into environmental management strategy? In other words, if you charge a higher price what does that lead to?

A Conservation.

Q Now, would you like to explain a little bit about buying and setting water aside? First of all, is that possible?

A I don't see why not. Certainly today, your Honor, we have dedications of water that have been made to the Texas Water Trust in both the Rio Grande and the San Marcos and perhaps in other places, so there's precedent for that.

Q What's the Texas Water Trust?

A The Texas Water Trust is a entity that was established to hold water for environmental purposes, that is, to allow it to remain in the river.

Q And I am reminded we have an exhibit of the participants in the Recovery Implementation Plan and who they were. I'd like --

What is that exhibit, 120?

It's Exhibit 120, and I --

BY MR. BLACKBURN:

Q I'm sorry, Exhibit 12.

Exhibit 112. I would ask you if this is a list of the participants in that process that you are aware of?

A Yes, sir.
Q So we have the Aquifer Coalition of Urban Areas, Alamo Cement Company, Bexar County, Bexar Metropolitan Water District, an individual, Carol Patterson?
A Right, some individuals.
Q City of Garden Ridge, City of New Braunfels, City of San Marcos, Victoria, Comal County, CPS Energy, Dow Chemical, East Medina Special Utility District, Edwards --
THE COURT: Okay, okay, okay.
BY MR. BLACKBURN:
Q But there's a bunch of them.
A Yes, sir.
Q And this is the group that came together to do the plan?
A Yes, sir.
Q Now, with regard to buying water, you said that your institute put 40,000 acre-feet --
A Texas State University.
Q Texas State University, which is what the Texas River Institute is a part of --
A Right.
Q -- is that right? They put 40,000 acre-feet of water into a trust --
THE COURT: Each year did you say?
THE WITNESS: No, ma'am, one time.
THE COURT: One time, okay.

MR. BLACKBURN: No, no, it's 30,000 acre-feet every year --

THE WITNESS: Right.

MR. BLACKBURN: -- or, you know, the spring is flowing.

THE COURT: Oh, so it keeps 40,000.

BY MR. BLACKBURN:

Q It keeps 40,000. Basically it's a constant 40,000 acre-feet over a year time period, is that right?

A Right.

Q So they have that as a water right, is that correct?

A Yes, sir. It was acquired as part of the acquisition of the old amusement park.

Q So this was like a water right that the State had issued many years ago to use water coming out of the springs?

A Right.

Q And they took that water right and dedicated it to the Water Trust?

A Right.

Q So what's the Water Trust?

A The Water Trust is a repository for such dedication.

Q Essentially it takes it and puts it in preservation?

A Right.

THE COURT: I got it.

MR. BLACKBURN: I'm sorry?

THE COURT: I got it.

MR. BLACKBURN: Good.

THE COURT: So how does -- so that's what you all need is water.

MR. BLACKBURN: Is water. Yes, your Honor.

(Mr. Blackburn and Mr. Mundy confer)

Let me just make one more point about the chart before we take it down.

THE COURT: All right.

BY MR. BLACKBURN:

Q Are both Guadalupe-Blanco River Authority and Texas Commission on Environmental Quality participants in this along with the San Antonio River Authority?

A Yes, sir.

Q Now, if I had a whole bunch of money and I found somebody to sell me water could I buy that water and put it in the Water Trust?

A I believe you could, yes.

Q Now, I don't have a whole bunch of money --

A Assuming you had a willing seller.

Q Assuming you had somebody that had an interest in selling or willingness. Are you familiar with the Natural Resources Damage Assessment, NRDA, process that's ongoing?

A Generally, yes, sir.

Q How do you know about the NRDA Process?

A Well, I've used --

THE COURT: What's the acronym for it?

MR. BLACKBURN: NRDA, Natural Resources Damage Assessment.

THE WITNESS: Over the years I've been able to access those funds in various ways. We used funds from the NRDA Process during the 1990s to purchase the licenses from shrimp boat operators along the Gulf Coast in order to reduce the total number of shrimping licenses.

THE COURT: Oh, I remember that.

THE WITNESS: Yes, ma'am, and that came from that funding source.

BY MR. BLACKBURN:

Q And that shrimp license buyback was a program developed while you were at Parks and Wildlife?

A Yes, sir.

Q And would that be sort of creative solution to try to compensate someone for something that might be necessary to protect a natural resource?

A Well, what it enabled us to do, and in my mind it is somewhat creative, there's not many programs like it around the world, is that it created a limited entry into the fishery, in other words it capped the number of people that could get shrimp licenses, and then used the marketplace to buy back licenses in order to reduce the overall catching effort in

order to maintain the species.
Q A different approach but in a way kind of a similar type of problem, perhaps a little different approach?
A Right.
Q Now, is there -- are there prospective NRDA damages that might be available to the Texas coast in the future?
A I would think so. I would think that, for example, as we discussed yesterday, the potential damages test that's coming out of the oil spill in the Gulf would be applicable for this purpose. And I have participated in the strategies for those funds.
Q And so if some sort of institutional concept were set up could that institutional concept, perhaps that entity make itself known to the NRDA Process and perhaps be able to get money to buy water to protect the bays and estuaries?
A I believe that it could.
THE COURT: You think that's a good idea for here?
THE WITNESS: Absolutely, your Honor.
BY MR. BLACKBURN:
Q But it would have to be set up?
A Right.
THE COURT: So you're saying I have to do a Court Order?
MR. BLACKBURN: No, I don't think so, your Honor. I think if we could just --

THE COURT: Work together I think?

MR. BLACKBURN: -- work together on kind of how we put language together and things like that we could begin to do some very interesting and creative things. I think those are possibilities. And I think, you know, you were asking about looking for solutions and things like that that might become possible. But once again I'm going to ask the hammer question.

BY MR. BLACKBURN:

Q Would much of the -- or anything in up in the aquifer have happened without the specter --

THE COURT: This is more than a specter. I mean we are here.

MR. BLACKBURN: I understand. We're just trying to be gentle about it.

THE COURT: Okay.

THE WITNESS: I believe is an essentially --

THE COURT: You've been hammering these guys for a while.

(Laughter)

MR. BLACKBURN: I have been and I'm not much of a hammer when it comes to --

THE COURT: I don't mean in this case, but I'm -- you know.

MR. BLACKBURN: No, no, I mean I'm talking, you know, generally, you know, water off a duck's back so….

Okay --

THE COURT: Would your institute help?

THE WITNESS: Yes, ma'am.

MR. BLACKBURN: And --

THE COURT: So there you have somebody, right?

MR. BLACKBURN: I've got one. I've probably got the Hart Institute that would be willing to jump in, that's probably two. TAP, three. Most of the environmental groups on the coast, you know, would be willing to participate.

THE COURT: What about the Guadalupe River?

MR. FERNANDES: We think we have a lot more creative proposals that when we put on our case you'll see are much more directed to the preservation of the cranes than what's being discussed here.

THE COURT: I understand that, but I guess I'm just looking at water.

MR. FERNANDES: Yes. It will involve water as well.

THE COURT: Okay. And habitat purchase, you think?

MR. FERNANDES: Which you'll learn is what the cranes really need when we put on our case.

THE COURT: Okay.

MR. BLACKBURN: In which we of course disagree with.

THE COURT: I understand. That's going to be interesting. Thank you.

MR. BLACKBURN: Your were asking, your Honor, about

perhaps ways --

THE COURT: Because I -- the reason, Mr. -- Mr. Fernandes, I keep on calling you -- Mr. Fernandes, the reason why I look at that, because I -- the coastal bend bays and estuaries, I know that they're purchasing land and increasing habitat, but the inventors out there have nothing to grow because it's a dead bay. So what they need is water also. So I know there has to be a combination, as you say. Any increase in habitat is apparently crucial because the witness yesterday told me that each family takes 300 acres, give or take, so if the population is going to grow there has to be an increase in habitat, but it also has to be habitat that has a freshwater flow. So you're absolutely right.

MR. FERNANDES: You'll hear that from our very first witness in terms of the combination and he is, frankly, somebody who's advanced in science in the area of the preservation of cranes more than anybody over the last 40 years.

THE COURT: So I'm with you there.

BY MR. BLACKBURN:

Q And do you think it is harder to get water than it is to get land?

A I believe that the transactions that many of us in the room have used over the years to acquire land can be applied to water. We just haven't really tried it yet. But it is harder.

Q And wouldn't that be a creative solution?
A Absolutely.
MR. BLACKBURN: Thank you, your Honor. I have no more questions. Pass the witness.
THE COURT: Thank you.
Ms. Robb?

CROSS EXAMINATION

BY MS. ROBB:

Q Good morning, sir.
A Good morning.
Q You said that you were involved in the creation of the Senate Bill 3 process, is that right?
A I was a part of the discussions, yes.
Q And the Senate Bill 3, or SB3 as we call it, process concerned -- was concerned with determining the necessary environmental flows for the estuaries, right?
A It established a process for getting there.
THE COURT: That's the process he says is a dead end for us.
MS. ROBB: Right.
THE COURT: So that's what you need to clean up.
MS. ROBB: We're working on that.
THE COURT: Okay.
//
//

BY MS. ROBB:

Q And that includes the Guadalupe and San Antonio Basins, right?

A Yes.

Q Isn't SB3 meant to be a long term management tool for the Guadalupe-San Antonio estuary?

A Well, I believe that it's a long term manage -- it was designed to be a long term management tool for all of our river basins.

Q And doesn't it involve the input of many stakeholders?

A Yes.

Q And it considers the best available science and scientific data?

A That's the theory.

Q And it also involves the consideration of policy issues that need to be balanced?

A Sure.

Q And essentially it involves complex decisions about resource allocation, right?

A Sure. Certainly.

Q And so let's then talk about habitat conservation plans, HCPs. Have you been involved in HCPs?

A Yes, ma'am.

Q HCPs are also meant to be a long term management tool, right?

A Yes.
Q And HCPs also involve the input of many stakeholders, correct?
A Could, not necessarily.
Q And they also consider scientific data?
A Yes.
Q And they involve the consideration of policy issues, correct?
A Yes.
Q So HCPs also address complex decisions about resource allocation?
A Certainly.
Q HCPs are usually done voluntarily, isn't that right?
A Could be.
Q And they're done for the purpose of applying for the incidental take permit, right?
A That's one of the purposes, yes.
Q So the HCP is --
A Perhaps we might explain what that is?

THE COURT: Please.

MS. ROBB: Please.

THE WITNESS: The incidental take permit, your Honor, is in the case of one of these, whether it's an HCP or habitat conservation plan or a recovery implementation program which would involve an HCP, enables the participants to have under

Section 10 of the Endangered Species Act what's called an incidental take permit. What that means is that inevitably, because of drought or other conditions, there might be an incidental loss of a member -- of an animal or a species protected under the Act and the participants would not be in jeopardy because of that incidental take.

THE COURT: Thank you.

BY MS. ROBB:

Q So an HCP is one aspect of receiving authorization to take an endangered species, correct?

A I probably would not have said it quite that way, but yes, that's the effect.

Q And an HCP doesn't protect against take, but it actually serves as a tool to obtain authorization for take, an ITP, an incidental take permit?

A I would say it indemnifies the participants against the jeopardy brought by an incidental take of a species.

THE COURT: So when exactly do you do that? I mean if you're in a terrible drought, for instance, as we are here. I don't really know the effects on the bays and estuaries right now, so I'm waiting to, you know, to hear -- I don't know what's happening this year. But do you do it in advance and say we're anticipating a drought and we're worried that this is going to cause a taking?

THE WITNESS: Certainly a drought, your Honor, could

be a condition that would, outside the control of the participants in the plan, bring about the incidental take of a species. That could be one such condition that would bring that about. There could be others.

THE COURT: Do you do it after the taking has occurred? I don't understand the --

THE WITNESS: You would do that before the potential taking occurred, you would execute that agreement with the Fish and Wildlife Service.

THE COURT: Okay.

BY MS. ROBB:

Q But, Mr. Sansom, there needs to be a finding of take?

A Right.

Q There needs to be a finding of take before one applies for an incidental take permit?

A Right.

THE COURT: So you don't do it anticipatorily?

MS. ROBB: No, your Honor.

MR. BLACKBURN: Your Honor, we'll have another witness come in to talk about HCPs, Mr. Frederick, and --

THE COURT: The guy in the back?

MR. BLACKBURN: Somewhere back, yes.

THE COURT: He's nodding his head.

MR. BLACKBURN: Back there in the back nodding his head. And he will discuss HCPs in detail.

THE COURT: Okay. I'll need some more help with that.

BY MS. ROBB:

Q This bay's SB3 process is not over, is it?

A Well, no.

Q You had expressed disappointment with the outcome of the process, right?

A Absolutely.

THE COURT: It hasn't had an outcome.

THE WITNESS: Well, the initial activity of the SB3 process on this bay has been completed. It has not been acted on by the TCEQ yet, but the stakeholder process was completed.

BY MS. ROBB:

Q But there's more to come in the process after the stakeholders complete their deliberations, correct?

A My point, Counselor, was that the fact that the stakeholders were unable to reach consensus is a very, very disappointing aspect of the process in this basin.

Q Let's pull up Plaintiff's Exhibit 112. This is the participants in the Edwards Aquifer Recovery Implementation Program that you just looked at with Mr. Blackburn. You said that you had participated in what we call the EARIP. Were you there for TAP, for The Aransas Project, on behalf of The Aransas Project?

A No, ma'am.

Q Do you know what The Aransas Project is?
A Certainly.
Q Okay. Is The Aransas Project on this list of participants?
A I do not believe so.
Q There were about 65 meetings of the steering committee the EARIP. About how many steering committee meetings did you attend?
A I'm not able to tell you.
Q Did you attend steering committee meetings?
A Oh, yes, ma'am.
Q Are you on the EARIP steering committee?
A No, ma'am.
Q Are you on --
A I have two employees, one of whom is the principal scientist on the project and the other has been the representative of the Texas State University on the project, and they are both colleagues and employees of mine and they participate on a daily basis.
Q Now, the EARIP grew out of the case where a Court --

THE COURT: What's EARIP again?

MS. ROBB: I'm sorry. The Edwards Aquifer Recovery Implementation Program, which is quite a mouthful, we often just refer to it as the EARIP for shorthand, your Honor.

//

BY MS. ROBB:

Q Now, the EARIP grew out of a --

THE COURT: Wait a minute. I'm just going to write this down right now.

MR. MUNDY: Your Honor, it's the title up on this document.

THE COURT: Got it. Go ahead.

BY MS. ROBB:

Q Now, the EARIP grew out of a case where a Court found a take of aquatic species, right?

A Yes. Yes, ma'am.

Q And the species lived in the Edwards Aquifer, correct?

A Or in the San Marcos River.

Q And the water they were living in was being pumped out, right?

A Correct.

Q So the take of the aquatic species was caused by and the direct result of the pumping, right?

A Correct.

Q You said that you had been involved in the acquisition of Matagorda Island to expand the territorial range for the future of the whooping cranes. Did I hear that correctly?

A That's correct.

Q Why was this important for the whooping cranes?

A Well, I believe that one of the reasons why the flock has

expanded over the years is that the protected areas for their habitat has expanded substantially over the past 25 or so years. One of the reasons why the flock began to expand is because the area protected for them expanded.

THE COURT: So that's exactly what the Defendants are going to tell me, is not why it's a lack of land, right?

MR. FERNANDES: Yes, your Honor.

MS. ROBB: Yes, your Honor.

MR. FERNANDES: There's no way you can get from 300 to a thousand with the current plan that's out there.

THE COURT: That makes sense. It makes sense.

MS. ROBB: I have no further questions. Pass the witness.

THE COURT: Anything further?

MR. BLACKBURN: May I return?

THE COURT: Yes.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q I just want to clarify a couple of things. Is it your understanding that a habitat conservation plan protects the endangered species?

A Correct.

Q And if part of that habitat is a bay system and if salinity is an issue, freshwater inflows is part of that habitat conservation plan, correct?

A Correct.
Q Now, Senate Bill 3, I want to be real clear, there are obviously two different processes set in motion by Senate Bill 3, your disappointment is with the bay and estuary and inflow portion of Senate Bill 3?
A Correct.
Q Now, once again, have you observed the Senate Bill 3 process in both Galveston Bay and Sabine Lake?
A Yes. And I was a member of the stakeholder committee on the Colorado.
Q So you've watched, you know, fairly closely three of these?
A Yes.
Q What has been your experience with the recommendations of the science team under Senate Bill 3 as they work their way up through the stakeholders up to the action by the Texas Commission on Environmental Quality?
A Well, the only one that I have direct experience with is the Colorado, and I was -- the Colorado group did reach consensus and the TCEQ has not taken action on it yet.
Q But absent consensus, what is the concern about TCEQ action?
A I think it reduces the impact of the recommendations to the Texas Commission on Environmental Quality.
Q And to the extent that on the one hand consensus was

reached on EARIP and has failed under the stakeholder process of the freshwater inflows, what is the only difference? What's the difference in those two situations in terms of -- well, is the oversight --

A The lack of a consequence for failure. There was no hammer.

Q So there's a lack -- you said a lack of the consequence of failure.

A Correct.

MR. BLACKBURN: Thank you, your Honor. No further questions.

MS. ROBB: Your Honor, may I be heard on redirect?

THE COURT: Certainly.

MS. ROBB: Or recross, excuse me.

RECROSS EXAMINATION

BY MS. ROBB:

Q Mr. Sansom, could you just explain what you mean by the lack of the consequence of failure?

A I do not believe that -- the attorney was asking me the question of what is the difference between the Senate Bill 3 process and the process of the EARIP and in the case of the EARIP I believe that the -- first of all, that the Legislature clearly mandated that the process take place and that in that case the federal -- the potential of the return of the specter of federal involvement was always hanging over the case, where

that is not the case in Senate Bill 3.

THE COURT: So what happens if the stakeholders don't reach a consensus? Tell me how that works.

MS. ROBB: In a RIP? Well, in -- in the EARIP it depends --

THE COURT: No, no, in this --

MR. BLACKBURN: No, this would be in the bay -- I think the question was for the bay and estuary inflows --

THE COURT: SB3.

MR. BLACKBURN: SB3 process, not the EARIP process.

THE COURT: No, SB3.

MS. ROBB: Well, I believe what was the SB3 process, your Honor, the stakeholders make a report, there are other committees that are set up, including the science committee, and then --

THE COURT: I got that. But I heard yesterday --

MS. ROBB: Yes.

THE COURT: -- or sometime from somebody from the science committee that said they never saw the stakeholders' report and weren't given access to the stakeholders' report. And here he's telling me the stakeholders for these two rivers for these bays and estuaries couldn't reach a consensus. So then what happens?

MR. WILLIS: Well, several things, your Honor. First of all, the State's first witness is going to address I think

in ample detail the Senate Bill 3 process, but --

THE COURT: So somebody's going to tell me?

MR. WILLIS: Yes. But also I'll just, since you brought it up, the witness that said that about the -- what he said was he never saw the stakeholders' report. My own version is that he implied that he was never given access to it, he didn't say it --

THE COURT: Yeah, that was the implication.

MR. WILLIS: -- but actually it's public information. If I'm not mistaken, it's posted on the website.

MS. ROBB: Yes, it is.

MR. WILLIS: It's on the Internet.

MS. ROBB: It's on the Internet.

THE COURT: Well, maybe he doesn't read the Internet.

(Laughter)

MR. BLACKBURN: I interpreted it that no one asked their opinion as the science committee.

THE COURT: I didn't.

MR. BLACKBURN: Okay.

THE COURT: I interpreted it that he was denied access to that. And so it's on --

MR. WILLIS: That's essentially the way I thought it was implied, but that's my own interpretation.

THE COURT: But I over implied, I guess, so --

MR. BLACKBURN: But that was not the intention of the

witness, from what I know of our conversations. It wasn't that he was denied access, he was --

THE COURT: So then my second level of interpretation was is that he thought they should have both worked together to do a joint report.

MR. BLACKBURN: And that's not the way it works.

MR. WILLIS: And again, this witness will explain the entire focus, in fact the process to Senate Bill 3, and I think it will become more clear and certainly you can ask the witness any questions on that --

THE COURT: Thank you.

MR. WILLIS: -- and I'll be seated.

THE COURT: Thank you.

MR. WILLIS: Thank you.

MS. ROBB: But the Senate Bill 3 process and the EARIP and all of these processes and HCPs are completely public and all of the documents are public documents.

THE COURT: Thank you.

BY MS. ROBB:

Q Mr. Sansom, you considered the EARIP a success, correct?

A Yes.

Q And the EARIP group didn't reach complete consensus on the HCP, did they?

(No audible response)

There was one nay vote, wasn't there?

A Correct.
Q And there was an abstention, which effect is a --
A Well, I think --
Q -- no vote?
A I think it's a different process and the result of that program is that there will be an implementation program in place, it will involve funding, and it will involve the Section 10 permit, so it is successful.
Q But it is --

(Pause; Ms. Robb and Mr. Fernandes confer)

BY MS. ROBB:

Q But in the stakeholder processes consensus can be reached and a success can be reached without full unanimity among the stakeholders, correct?
A Certainly.

MS. ROBB: Thank you, those are all my questions.

MR. BLACKBURN: Your Honor, I have no more questions of this witness.

THE COURT: Thank you, sir.

THE WITNESS: Thank you, your Honor.

THE COURT: It was nice to hear from you. You may step down.

(Witness excused)

MR. BLACKBURN: I'd like to call Mr. Ron Outen to the stand.

THE COURT: Could you come forward, please.

Administer the oath.

RONALD OUTEN, PLAINTIFF'S WITNESS, SWORN

THE COURT: How do you spell your name?

THE WITNESS: O-u-t-e-n.

THE COURT: Thank you. And it's Ronald?

THE WITNESS: Ronald or Ron, yes, ma'am.

THE COURT: Thank you.

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q Good morning, Mr. Outen.

A Good morning.

Q Am I correct that you have already introduced yourself to the Judge?

THE COURT: Well, we had some waiving back and forth.

Q Okay, would you formally introduce yourself to the Judge?

A My name is Ronald B. Outen.

Q And where do you live, Mr. Outen?

A I live in Rockport, Texas.

Q And I'm not going to spend a lot of time on your educational background, but you do have a Ph.D., right?

A I do.

MR. BLACKBURN: And I just want to stipulate, your Honor, I'm not inviting Mr. Outen here as an expert witness, he is here on behalf of TAP for standing purposes.

And so I will try to keep my presentation narrow and not ask him a lot about a lot of things he has a lot of opinions on that frankly are not germane to standing.

THE COURT: All right, thank you.

BY MR. BLACKBURN:

Q Where do you live, Mr. Outen?

A In Rockport, Texas.

Q I guess it's Dr. Outen, isn't it?

A I'm happy either way.

Q Now, are you familiar with a group known as The Aransas Project?

A Yes, I am.

Q And are you a member of The Aransas Project?

A Yes, I am.

Q So you're individually a member and do you have an elected position in Aransas County?

A Yes, I'm a commissioner on the Aransas County Navigation District.

Q And is the Aransas County Navigation District a member of TAP?

A Yes, it is.

Q And do you also have a position within the TAP organization itself?

A Yes, I do.

Q And what is that position?

A I'm a member of the board of directors of The Aransas Project. I also have the title regional director.
Q And what do you do as regional director?
A My duties as regional director revolve around outreach to the public generally and especially in the Aransas County area and performing liaison functions between TAP as an organization in that community and doing public education and things like that.
Q And what exactly is the mission of The Aransas Project?
A The mission of The Aransas Project is to advocate for adequate freshwater inflow into the bays, the marshes, and associated with the bays for the benefit of the health of the bays, the fisheries, and most especially the whooping cranes.
Q And are you aware -- did TAP vote to initiate this litigation?
A Yes, it did.
Q And so was it duly authorized by board action?
A It was authorized by board action.
Q And is TAP an incorporated nonprofit entity in the state of Texas?
A Yes, it is.

THE COURT: Was it formed to file suit?

THE WITNESS: Litigation is specifically mentioned in the Certificate of Formation.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Now, I would like to put Plaintiff's Exhibit 381 up. I guess this is an official copy of it.

THE COURT: Would you turn on the Elmo, Ms. Gano?

MR. BLACKBURN: I'm sorry; do I have to offer 381?

THE COURT: Okay.

MR. BLACKBURN: Let me offer Exhibit 381. That is from the website of The Aransas Project and it identifies the membership, the organizational membership of The Aransas Project.

MR. FERNANDES: Do you want to do 382 as well; we have no objection to 381 or 382.

MR. BLACKBURN: Actually 380 and 381.

MR. FERNANDES: We have no objection to 380 as well.

THE COURT: 380 and -- Plaintiff's 380 and 381 are admitted.

(Plaintiff's Exhibits Numbers 380 and 381 were received in evidence)

BY MR. BLACKBURN:

Q And what I'd like to do first of all is ask you to identify the municipalities that are members of The Aransas Project. The municipalities are --

A Thank you, that helps. The City of Rockport and the town of Fulton.

Q And the County entity we've already met, Judge Mills?

A Yes, Aransas County.
Q And then the Navigation District. What about political organizations?
A Both the Aransas County Republican Party and the Aransas County Democratic Club are members.
Q Okay, and then national and international organizations?
A The American Bird Conservancy, the International Crane Foundation, and the Whooping Crane Conservation Association.
Q And who is the leader of the International Crane Foundation?
A That's Dr. Archibald, who we heard from earlier.
Q And with regard to the Texas organizations?
A Aransas Bird and Nature Club, Audubon Texas, Coastal Bend Audubon Society, Coastal Bend Guides Association, Environment Texas, Galveston Bay Conservation and Preservation Association, Houston Audubon Society, Matagorda Bay Foundation, Travis Audubon Society, and Texas Conservation Alliance.
Q And businesses? And there's a number, could you just give me more of a description of the type of businesses?
A They're diverse. The first one happens to be a bed and breakfast. We have another -- The Crane House of course is the same. We have commercial businesses there that depend on the harvest from the bays, like Casterline Fishing Company, fishing guides who rely upon the productivity of the bays such as James Fox Guide Service and the Coastal Bend Guides Association,

various entities involving real estate in one way or another, and of course a couple of the business entities that directly -- that provide guiding services specifically related to whooping cranes.

THE COURT: So what's your business?

THE WITNESS: Ron Outen Associates?

THE COURT: Yes.

THE WITNESS: I have an environmental consultancy.

BY MR. BLACKBURN:

Q And --

THE COURT: Okay.

MR. BLACKBURN: I'm sorry.

THE COURT: Go ahead.

Q And in your individual capacity how would you be harmed, and I'm not speaking for -- you know, I'm talking about you, I mean how would you personally be harmed if -- or, you know, what harm do you see that causes you to join camp and be part of this litigation?

A Well, I see a couple of kinds of harm.

THE COURT: Stop clicking. Thank you.

Q I was going to say --

A The first is -- the first is that I'm a person who is very much oriented toward conservation and outdoor activities, a much earlier background in ecology and so forth. And one of the principal reasons my wife and I moved to Rockport was

because of the natural environment that we had such close access to and that most definitely includes the National Wildlife Refuge and the whooping cranes. I've come to be -- to feel a very close attachment to whooping cranes, even before my association with TAP, and so any loss or damage to that organism would be painful for me.

Economically, my wife and I own three investment properties in Aransas County, we believe, I believe that the attractiveness of Aransas County to new residents and visitors is very closely tied to the reputation the community has as a gateway of access to beautiful productive bays and also proximity to the whooping cranes. I'm concerned that anything that diminishes Rockport's appeal in that part, in that direction, will be adverse to our property interests.

Q And in terms of the member organizations, could you give a general description of some of the different types of reasons that have been given for groups joining the TAP organization?

A Sure. Much of what I would have to say is similar to that stated by Judge Mills, Aransas County is very much a tourism economy and some of the various businesses that we have here depend on that. People who come to see whooping cranes, for example, will stay at Anthony's Bed and Breakfast, for example. The general level of visitation relates to attractiveness of the community, ability to provide amenities, and therefore property values, which affects all of the various real estate

interests which show up there, most definitely the guides who are directly taking people to see the whooping cranes have a direct interest in their well being, and things of that nature.

Q And let me ask you in terms of TAP, in TAP involved in more than this litigation?

A TAP is involved in -- it's a difficult question because --

THE COURT: Is what?

MR. BLACKBURN: Difficult.

THE COURT: I know, but the question was?

MR. BLACKBURN: The question was is TAP involved in more than this litigation?

THE COURT: Oh, okay.

THE WITNESS: Yes, TAP is interested in and involved in trying to deliver inflows to the bays for purposes that reach beyond whooping cranes specifically, that go to the health of the bays for purposes of commercial and recreational fish.

THE COURT: So what action are you taking to do that?

THE WITNESS: I beg your pardon?

THE COURT: What action are you taking to do that, to get inflows?

THE WITNESS: We have been participating, for example I've attended a number of meetings of the SB3 process stakeholder groups that has been described and have spoken, commented about the need for freshwater from the bays. I have

encouraged --

THE COURT: On behalf of TAP?

THE WITNESS: I'm there as -- yeah -- yes, your Honor, I -- well, sure, yes, I'm there, I'm on behalf of TAP.

THE COURT: Why don't we just everybody agree that this group was formed to litigate? I don't see any problem with that. It may have a long term --

MR. BLACKBURN: Well, I think it has a longer term goal than that.

THE COURT: I'm sure it has a longer term goal.

MR. BLACKBURN: Okay.

THE COURT: Once you get people together they get excited and they're a group and they go forward.

MR. BLACKBURN: Okay, and --

THE COURT: But surely this was created for this litigation.

MR. BLACKBURN: That certainly is a major part of it.

THE COURT: I would imagine.

BY MR. BLACKBURN:

Q The -- two things I want to cover very quickly, funding for TAP, where does the bulk of the funding for TAP come from.

A The funding for TAP comes from, hmm, excuse me, several elements of the D.M. O'Connor Ranches --

Q So several --

A -- that's the primary funding source.
Q Some of the family members of the D.M. O'Connor Ranches.
A Some of the family members, yes.
Q And is there a D-structure for TAP?
A There is no D-structure.
Q Has TAP received donations from a number of the member organizations and the individual members?
A TAP has received -- yes. The answer is yes.
Q And --

THE COURT: Is it O'Connell or O'Connor?

MR. BLACKBURN: O'Connor.

THE COURT: O'Connor. Like Port O'Connor?

MR. BLACKBURN: Like Port O'Connor.

THE COURT: Okay.

BY MR. BLACKBURN:

Q And I guess finally Exhibit 380 is a group of the individual members to TAP and that is on the website of the organization, is that right?
A That's right.
Q And are there some members that asked not to be on there?
A Yeah, the people who wish to support TAP are given an option of being visible or not visible on the website and some people choose to not be listed in public.
Q So these are the ones that have chosen to be listed?
A These are the ones that have chosen to be listed, yes.

MR. BLACKBURN: With that, I pass the witness, your Honor.

THE COURT: Thank you.

CROSS EXAMINATION

BY MR. FERNANDES:

Q Good morning, Mr. Outen.

A Good morning.

Q I promise you're not going to be five hours, like I was at your deposition. I think I have about a dozen questions here.

A Okay.

Q And the first one is you've testified that TAP has numerous members.

A Yes.

Q But TAP's members don't pay any member dues, do they?

THE COURT: I got that. I know what this is about.

MR. FERNANDES: Okay. Let me --

THE COURT: But it doesn't change the -- it doesn't change.

MR. FERNANDES: I was just trying to make a quick record, because it is --

THE COURT: It's funded by the O'Connor family.

MR. FERNANDES: Yes.

THE COURT: For purposes of litigation.

MR. FERNANDES: And I'll do what may be my last two questions.

BY MR. FERNANDES:

Q Isn't one of TAP's stated purposes -- Isn't one of TAP's stated purposes the research, development, and publication of proposals to protect the health of streams and estuaries in Aransas, Texas area?

A Yes.

Q But TAP has never prepared any research, development, and publication proposals to protect the health of the streams and estuaries in Aransas, Texas area, has it?

A Could I see that sentence in writing in anyway?

MR. FERNANDES: Could you just show Page 71?

MR. BLACKBURN: Your Honor, we would specify the expert reports in this litigation are those reports.

THE COURT: From TAP members?

MR. BLACKBURN: Yes.

MR. FERNANDES: There's no --

MR. BLACKBURN: From TAP itself.

THE COURT: Okay.

MR. FERNANDES: Can we just pull up his deposition?

BY MR. FERNANDES:

Q Do you recall when I took your deposition under oath I asked you --

THE COURT: Is that an exhibit? Is that an exhibit?

MR. FERNANDES: I'm trying to cross examine him from the deposition.

THE COURT: Okay, well I don't think that's -- if it's not an exhibit it doesn't go up like that.

MR. BLACKBURN: And -- your Honor, we object to using this as an exhibit. This is not impeachment.

THE COURT: Sustained.

MR. FERNANDES: I'm going to impeach him the old fashioned way.

THE COURT: That's it.

MR. FERNANDES: That's it.

THE COURT: You got it.

MR. FERNANDES: And for Counsel, if you look at Page 71, Line 17, to Page 72, Line 7 of his deposition.

BY MR. FERNANDES:

Q Do you recall me taking your deposition in this matter on -- let me find the date here -- August 3rd of 2011?

A I recall that deposition. I would request again that I be able to see the language that you just defined at certain pages.

Q Yeah, Counsel objected to it so I'm going to show it to you in two seconds.

MR. BLACKBURN: Well, usually I think proper impeachment procedure --

THE COURT: Mr. Fernandes, he's talking about the use of that for impeachment. Do you want me to tell you how to do it?

MR. FERNANDES: I'm going to -- if I may approach I'm going to give him a transcript.

THE COURT: Just say did you say the following.

MR. FERNANDES: Can a give him a transcript so he can watch it?

THE COURT: Sure.

MR. BLACKBURN: The question was the purpose of the organization. Mr. Outen asked for a copy of the purpose of the organization to read. That was what was requested. And then Mr. Fernandes started impeachment.

MR. FERNANDES: Okay, I misunderstood his response. I'll show him the Certificate of Formation. If we can put up the Certificate of Formation maybe we can through all of this.

THE COURT: I know you can do it.

MR. FERNANDES: If you can put up the Certificate of Formation, Defendants' Exhibit 63.

And you can keep that transcript.

BY MR. FERNANDES:

Q Sir, does Defendants' Exhibit 63 appear to you to be a true and correct copy of the Certificate of Formation of TAP?

A Yes, it appears to be.

Q And do you see on Article IV it says purpose, the corporation is organized for the following purposes, do you see that?

A Yes.

Q And one of those purposes is the research, development, and publication of proposals to protect the health of streams and estuaries in Aransas, Texas area. Do you see that?
A Yes.
Q Isn't it true that TAP has never prepared any research, development, and publication proposals to protect the health of streams and estuaries in Aransas, Texas area?
A I don't believe that's correct. We have been all along working on the development of proposals for how to manage the inflows to provide the necessary water in the hope and expectation we would have a forum for doing that as a result of this trial.
Q Could you look at Page -- in front of you I've given you a deposition -- Page 70 of your deposition transcript in front of you?
A Page 70.
Q I'm sorry, 71.
A Okay.
Q Specifically Line 17 didn't I specifically ask you "Have you prepared any research proposals since you've been working at TAP," what was your response?
A I'm still catching up. This is Page 71 --
Q Line 17.
A -- beginning on Line 17?
Q Are you with me?

A Yes, I am. Would you give me just a moment to review this?

(Pause)

Okay, well yes, I see it.

Q All right. First of all, do you recall when I asked you "Have you prepared any research proposals since you've been working at TAP" wasn't your answer no?

A I did, but I continued requesting clarification.

Q And then does that go on to say "Have you developed any proposals since you've worked at TAP?" and you said "Could I get some clarification on that?" correct?

A Yes, I did.

Q And I said "Sure" and you said "Do you mean in the formal sense of writing up proposals and budgets for all that?" I said "Yes" and you said "Well, I guess it sort of depends on what constitutes a project. I proposed we participate in a couple of festivals, which we did." And then I went on to say "Have you developed any research proposals?" and you said no, correct?

A That is correct.

Q Now, for --

A And let me -- I want to offer a comment about this. My understanding at the time we were having this discussion was that you were asking specifically about formally published research proposals, such as something one might write for a

granting agency or something like that, and the answer to that is no. Our -- but we definitely have -- we definitely have done other kinds of research and we've developed, you know, plans and internal proposals and performed that research.

Q Mr. Outen, isn't it true that you didn't request or receive a copy of the necropsies relating to the two cranes that had died until approximately three months after TAP filed this lawsuit?

A You mean me personally --

Q Yes.

A -- or TAP?

Q You.

A I did not personally do that.

Q And there are no other employees of TAP either?

A No. I turned the information over to counsel.

MR. FERNANDES: Pass the witness, your Honor.

MR. BLACKBURN: Your Honor, I have no further questions.

THE COURT: Thank you, sir. You're excused.

THE WITNESS: Thank you very much, your Honor.

(Witness excused)

THE COURT: Next witness? Or is it break time?

MR. BLACKBURN: How about that?

THE COURT: All right.

MR. BLACKBURN: Thank you, your Honor.

THE COURT: Is this your last witness?

MR. BLACKBURN: This is my last witness --

THE COURT: Okay.

MR. BLACKBURN: -- your Honor. Well, the ones coming today.

THE COURT: And you all, just in case, you have got witnesses here?

MS. SNAPKA: There are witnesses prepared and ready to go on, your Honor.

THE COURT: All right, thank you.

(A recess was taken from 9:54 a.m. to 10:09 a.m.; parties present)

THE COURT: Has it been 15 minutes or do we get another few?

MR. UNIDENTIFIED: Fifteen.

THE COURT: Fifteen. Okay, let's go. Ready?

MR. BLACKBURN: Ready. Your Honor, before I call David Frederick if I may recall Larry Soward? I'll just be with Soward real quick. If you don't mind him appearing without a tie.

THE COURT: No, I don't have a problem.

MR. BLACKBURN: I'd like to recall Larry Soward to the stand, please.

THE COURT: You're still under oath, Mr. Soward.

Any objection to him being recalled?

MR. WILLIS: No, your Honor.

MR. FERNANDES: I guess our only objection is one of time. I looked at the time earlier today and their use of time is almost double ours. We're going to try and get through next week in about four days and it's going to start recalling witnesses. It's going to be difficult to get it done --.

THE COURT: I'll take that under advisement.

MR. BLACKBURN: But this will take five minutes.

THE COURT: Okay.

MR. BLACKBURN: Or less.

THE COURT: Make it four.

MR. BLACKBURN: I'll do four.

LARRY R. SOWARD, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q Mr. Soward, were you here when the conversation occurred about fees and costs assessed for water, surface water in the state of Texas by the TCEQ?

A Yes, sir.

Q And do you have some knowledge about those fees?

A Yes, sir.

Q And what is the charge that the State makes to a water permitee?

A The current rules of the TCEQ, and I believe it's Rule 21.3, imposes on water rights uses, consumptive uses, a

fee of 39 -- 39½ cents or 38½ cents per acre-foot per year.
Q Thirty-nine cents per 325,000 gallons?
A Yes, sir.
Q That's what the State charges to a water user under permit to take State water?
A For consumptive use.
Q And were you instrumental in raising that fee?
A I believe I was. The fee prior to I believe 2008 or early 2009 was 13 cents per acre-foot for a water right for consumptive uses and the agency had year after year saw their budgets cut by the Legislature and, needless to say, the duties and responsibilities never get cut when that happens, so the agency was always looking for ways to try to fund its operations and in the water rights program, which traditionally had been general revenue of the State, that was the first thing that the Legislature cut. So when the issue came up about trying to find more money I immediately looked at that fee, because I had, over the course of my term, been asked to make numerous presentations and speeches on water funding and it always just amazed me that the State of Texas was only charging 13 cents an acre-foot for water that was State water, a State resource, and yet when that water rights holder got that water they could sell it for hundreds or thousands of acre-foot and the Texas -- the State of Texas got no additional remuneration for that Texas resource. So that was the first thing that I

asked staff to look at, is raising that water use fee to help provide additional funds to support the water rights permitting program in the agency.

MR. BLACKBURN: Thank you, Mr. Soward.

MR. WILLIS: Briefly, your Honor?

THE COURT: Yes, sir.

MR. WILLIS: It will take ten seconds.

THE COURT: Absolutely. Take as long as you want, because this is obviously unexpected.

THE WITNESS: And your Honor, I apologize for not wearing a tie, but I didn't expect to be here.

THE COURT: I don't have a tie on, so don't worry about it.

RECROSS EXAMINATION

BY MR. WILLIS:

Q Good morning, Mr. Soward.

A Good morning, Mr. Willis.

Q To make sure we're understanding the nomenclature here, when you said these fees, this is not -- TCEQ is not selling water, they're actually getting a fee from the developers?

A TCEQ is getting a fee from each water right that it has issued authorization for.

Q Okay. And just so -- I want to make sure the Court understands the difference in that, and then the price per acre-foot, that's by someone who actually owns or actually has

the water impounded and has the ability to sell it?
A That's correct.
Q Okay. And then another value is actually if you're selling a water right?
A That's correct.
Q Okay. And these things that you're talking about, the actual cap is set by the Legislature?
A Yes, I believe -- I can't remember exactly the cap, but there is a cap.
Q Okay. Right, but I just want to make sure that the difference is TCEQ doesn't get to set -- TCEQ can set the fee, right, but it must be within the legislative cap?
A Yes.

MR. WILLIS: Okay.

THE COURT: What's the cap?

MR. WILLIS: You know, I was going to ask Mr. Soward if he knew.

THE WITNESS: I want to say 50,000, but, you know, that part I can't remember exactly. It's in the statute.

MR. WILLIS: It's in the statute, your Honor. We'll get it for you.

THE COURT: Thank you.

MR. WILLIS: All right. Thank you, Mr. Soward.

THE WITNESS: Yes, sir.

THE COURT: Thank you. Anything further?

MR. BLACKBURN: Just for clarification.

FURTHER REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q Fee is for administration, is that --

A That's what it's being used for presently.

Q Could it be used for other purposes?

A I believe it could.

MR. BLACKBURN: Thank you, your Honor.

THE COURT: Thank you.

MR. WILLIS: Nothing further, your Honor.

THE COURT: Okay.

THE WITNESS: May I be excused?

THE COURT: Yes, sir.

(Witness excused)

Next?

MR. BLACKBURN: I'd like to call David Frederick to the stand.

DAVID C. FREDERICK, PLAINTIFF'S WITNESS, SWORN

THE WITNESS: Good morning, your Honor.

THE COURT: Good morning.

MR. BLACKBURN: Excuse me, may I --

THE COURT: Yes.

MR. BLACKBURN: -- get a bottle of water?

THE COURT: Is that an old bottle up there or --

MR. BLACKBURN: No, it's full, your Honor.

THE COURT: You're not refilling them, are you, and putting them up there?

(Laughter)

MR. BLACKBURN: We should sell them.

THE COURT: Forty cents an acre-foot.

MR. BLACKBURN: Not for these.

THE COURT: Go ahead.

DIRECT EXAMINATION

BY MR. BLACKBURN:

Q Would you introduce yourself to the Judge, please?

A Your Honor, my name is David Charles Frederick.

Q And Mr. Frederick, where do you currently live?

A Pagosa Springs, Colorado.

Q And what is your occupation?

A I'm right I have two, I'm an environmental consultant and I'm also part owner of a seed company.

Q Seed company?

A Yes, sir.

MR. BLACKBURN: Did we have a resume, Dave?

MR. KAHNE: Yes, 257.

BY MR. BLACKBURN:

Q I'm going to place Exhibit 257 on the screen and ask you if you provided us with a true and correct copy of your resume of your professional career?

A Yes, sir.

Q And what I'm going to do is I'm going to just kind of walk you through question and answers and we're really not going to read this document.

Now, when did you graduate from college?

A 1972.

Q And what did you get a degree in?

A Fish and wildlife management and conservation.

Q And where did you graduate from?

A Louisiana Tech University.

Q And prior to that had you served overseas?

A Yes, sir, I did my high school trip with the Marine Corps from '66 through '68.

Q And then you came back and went to school and got your degree?

A Yes, sir.

Q Now, how long were you employed by the United States Fish and Wildlife Service?

A Thirty-two years.

Q And did you have any employment prior to working with the U.S. Fish and Wildlife Service?

A Yes, sir, in steel mills in Pittsburg, Pennsylvania, BOM, Bureau of Land Management, and the U.S. Forest Service.

Q Now, I'm going to ask you to give a quick summary, and I mean just sort of highlights, like really almost locations and sort of positions, and then I'm going to come back and ask you

in some detail prior to asking your Honor to accept you as an expert.

But with Fish and Wildlife Service, what were your primary assignments over that 33-year period?

A It was 32.

Q Thirty-two, sorry.

A I started at Lamar National Fish Hatchery in Pennsylvania as a fisheries biologist. Also I then moved to Beaver Springs, Arkansas as assistant hatchery manager. I moved to Vicksburg, Mississippi and changed divisions within the Fish and Wildlife Service to the Ecological Services Division working primarily on the Clean Water Act.

Q And about what year did you move to Vicksburg and start the Clean Water Act work?

A '80, 1980.

Q And what were you primarily involved with there in just a broad general sense?

A The Clean Water Act, trying to convince the Corps of Engineers for protection on wetlands of the United States.

Q And we'll come back to that, but where did you go after your time in Vicksburg?

A Houston, Texas as assistant field supervisor for the Ecological Services office in Houston.

Q And how long approximately were you in Houston?

A Four years, sir.

Q So that gets me to when, about 1988 or so?
A '84 -- no, '88, yes, sir.
Q And then where did you go in 1988?
A I took the position of state supervisor for the U.S. Fish and Wildlife Service in Washington State.
Q And how long did you stay in that position?
A Ten years, sir.
Q And during that time period did you happen to become involved with something called the spotted owl?
A Yes, sir. I helped list the spotted owl for the State of Washington.
Q And were you involved in I'd say an ongoing series of controversies over that whole process?
A In my opinion, and I think probably most people of that era, that was probably the toughest environmental controversy that the U.S. Fish and Wildlife Service has ever been into.
Q And after you served ten years in the state of Washington what did you do?
A Moved to Austin, Texas, took over the field office in Austin, Texas, which at that time covered about two-thirds of the state of Texas was our responsibility.
Q And how long did you stay at the field office in Austin?
A Four years, sir.
Q And then after you finished your tenure in Austin -- and you were, I believe, the head of the Austin office?

A Yes, sir.
Q Then where did you go?
A To Albuquerque, New Mexico as the chief of Habitat Conservation over a four state area.
Q Now, I want to talk a bit about your experience with endangered species. Starting -- well, no, let me go even back a little bit before that. And I don't want to get into a lot of the details, but during the early 1980s was there significant controversy over the Corps of Engineers' program under Section 404 of the Clean Water Act to protect wetlands?
A Yes, sir.
Q And were you involved in what is sometimes affectionately known as the Wetland Wars?
A Deeply involved in the Wetland Wars.
Q And ultimately what was the outcome of the controversy over bottomland hardwoods in the lower Mississippi Basin?
A There was consternation about the wetland classification for bottomland hardwoods and at that time, just a quick history, when soybeans reached $10 a bushel in the lower Mississippi Valley from Cairo, Illinois to Atchafalaya River in Louisiana they were being destroyed, countless thousands of acres were being destroyed to put into soybean production.
Q And what was being proposed being destroyed?
A The bottomland hardwoods with -- they had wetland soils, they had all the criteria for wetland, but the Corps of

Engineers and the Fish and Wildlife Service was an advisory agency under the Clean Water Act, we disagreed vehemently with each other and --

Q So agencies don't always agree?

A Oh, Lord, no, not even close.

Q And ultimately, I don't want to hear all of the details, but ultimately were you successful in preserving bottomland hardwood areas?

A Two of us in partnership with the Fish and Wildlife Service decided to do a two-week lay in the swamp type of thing to designate by photograph and by soil sampling that the last remaining large block of bottomland hardwoods north of the Atchafalaya was truly a wetland. We won that argument with EPA, as well as the Corps of Engineers, and right now there's 138,000 acres that's called the Tensas National Wildlife Refuge, and I do believe the state management area is a little over 80,000, were saved as one contiguous block.

Q The ultimate outcome of that was coming up with the preservation of at least a significant piece of bottomland hardwoods?

A Yes, sir.

Q So you then go to Washington State.

A Yes, sir.

Q How did you come to be involved with the spotted owl?

A I had worked for the Forest Service earlier in Washington

State at the Forest Hydrology Laboratory and my territory was Washington, Oregon, and Idaho. Frankly, in those days there was very few biologists with the Forest Service except researchers. When I got back to Washington State one of my favorite places in the world was the Olympic Peninsula. I can't explain to you what old growth is. It's almost like walking into a cathedral. Well, the first week I arrived back in Washington State I took a seaplane, an Otter, and flew the Olympic Peninsula and what I remembered from 17 years before was gone. You could take a, how can I put it, a razor blade in the Olympic National Park, take a razor blade and clear the national forest, and that's what I flew over. And I really have to tell you I was physically ill when I got off that airplane.

The Forest Service at that time was under Judge Dwyer's Court was being accosted because of a failure to do their job under federal law. And there was also an illegality on that national forest where a forest supervisor in the Olympic National Forest was double stamping logs. Any log cut on a national forest has to be used in this country. He would stamp them as they were cutting them and then re-stamp them and the Japanese were taking all those logs over to Japan in most cases.

So it was a pretty telling thing for me. So -- in fact, all three states, Oregon, Washington, and California, the

three state supervisors at that time, I wrote a white paper to my upper echelon requesting listing of the spotted owl, within weeks the other two state supervisors of the other states did the same thing and we helped list the spotted owl in all three states.

And that became known as the Timber Wars, very controversial, very tough time. I was hung in effigy several places. But the --

THE COURT: But not by the spotted owl.

THE WITNESS: No, no.

(Laughter)

The problem that most people didn't realize at that time was the big timber companies were downsizing. If you look at timber production in the Pacific Northwest, it's a spike. It goes up and down very quickly. Well, the old growth was almost all cut, except for I won't say small patches, but small areas compared to what it was, and it was affecting literally hundreds of species by doing this. So my job is to protect endangered species and that's why I helped list it in the state of Washington.

BY MR. BLACKBURN:

Q Now, over the ten-year time period did you come to have experience with something called a habitat conservation plan?

A Yes, sir. Can I do a little historical thing?

Q Sure.

A Okay, in 1973 the Endangered Species Act was formulated under President Nixon. The problem with the Endangered Species Act with that issue is private landowners, developers, normally lawful activities, they could not get a permit to do their activities. There was nothing a private person, a state, whatever, could do. So in the wisdom of Congress and I think a lot of pressure from their constituents they passed an amendment, and it's Section 10(a)(1)(B) of the Endangered Species Act, that allowed an applicant if there was a threat of a take of an endangered species to come to the U.S. Fish and Wildlife Service and request a 10(a)(1)(B) permit, in other words an incidental take permit.

This, I heard it referred to today as a hammer. I don't think of it as that. I think it allows flexibility for economic gain by the public, as well as protecting endangered and threatened species, to get together in a partnership and work together through the incidental take process and hopefully at the end of it everybody walks away singing Kumbaya.

The reason I say this, it's a very flexible system. Alternatives can be included. The Fish and Wildlife Service does not do an HCP, the applicant does, along with the Fish and Wildlife Service to guide them through the process. There can also be, if it's a huge -- I mean a huge permit system or a huge permit that they're asking for, stakeholders can be brought in. Sometimes that happens, sometimes it doesn't.

But anyway, at the end of the process if everything is garnered national -- the NEPA process, as well as Section 7 of the Act, has gone through public involvement, federal register notices, then an incidental take permit is issued.

THE COURT: I'm getting my acronyms confused. You said the applicant does the what?

THE WITNESS: The applicant actually does the habitat conservation plan.

THE COURT: Thank you.

THE WITNESS: With advisement from the Service. And the reason that is done is because of the specter of an endangered species being taken and the Fish and Wildlife Service, your Honor, guides them through the process and if there's holes in that particular process they help the applicant get through those.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q So during your time -- well, I'm sorry, let me go back. Incidental take.

A Yes, sir.

Q I want to try to be real clear about what that is. I mean if I have a habitat conservation plan its purpose is to protect the species, right?

A Yes.

Q Yet I get permission to take a species?

A Can I give a quick example?
Q Sure.
A Let's say a developer buys a piece of land for ultimate development. And this happens a lot in Austin, Texas. The problem was that black-capped vireo and golden-cheeked warbler habitat. Well, if he develops it he literally adversely affects and modifies the habitat that these endangered species live in. And without the incidental take permit they could never develop, but working as a partnership with the federal government they have a way out of it. If they're going to clear some trees that they nest in, they do it after the nesting season under the incidental take permit. This is all outlined in great detail, the biology, the whole nine yards for the species. There's ways to progress this and at the end the developer gets his economic gain, if that's his bent, and the species not only survives, but has a chance to recover.
Q And where does science come into this?
A A lot of the species that are listed in the United States do not have a tremendous amount of sp -- I mean science behind it. It's an imperfect world in a lot of cases. You do the best science you possibly can using the best sources you can and the Service will make a decision whether the applicant has produced a document that covers all aspects that is known about that species, including the impacts, both indirect and direct impacts to the species.

Q There's no reason why the applicant couldn't seek, for example --

THE COURT: (Coughs) Sorry.

MR. BLACKBURN: That's okay.

THE COURT: Go ahead.

BY MR. BLACKBURN:

Q No reason the applicant couldn't seek or be well advised to include or to ask for a group of scientists to come in and participate and help develop and come up with a scientific plan?

A They could ask anybody they want to come in and help from the standpoint of bringing along this permit application and bringing along the scientific studies it's going to need to preclude in an agreement by the Service.

Q And your experience with habitat conservation plans in the state of Washington, did you over time learn to work through that process and deliver successful habitat conservation plans?

A Yes, sir. Some of the larger timber companies, we're talking hundreds of thousands of acres and we're talking multitudes of species on the candidate list and whatever, and I -- instead of trying to make enemies we tried to make partnerships. And that's hard for an ex-marine to do, but in that particular case it was a worthy effort. Like the State of Washington owned tens of thousands of acres of state land that they used their cuttings off those lands to pay for their

schools in the state of Washington. We worked with them through that. I could name a few, Plum Creek Timber Company, Murray Pacific Timber Company, there's multitudes. Everybody looked at each other across the table when this first started as oh, my God, we're here, by the time it was ended they were coming in in droves. Because the process, don't get me wrong, on large pieces of land and large candidate lists and whatever else can be a heavy load to lift, but if you're a partnership you lift it together. The timber companies, of course, they had to pay for the HCP. They paid for the monitoring. That's all part of the law. But at the end they walked away with surety about their production into the future and we walked away with an endangered species that was protected on that piece of land. So --

Q Now --

A -- it worked.

Q You left Washington State with this experience and you came to Austin, Texas.

A Yes, sir.

Q Any endangered species in Austin?

A A bunch.

Q Which ones did you work with specifically?

A Well, Houston toad, black-capped vireo, golden-cheeked warbler, all the karst species --

Q What are --

A Karst are --
Q -- spell karst.
A K-a-r-s-t species. These are cave dwelling species that don't see the light of day. And many others, candidates that people would ask.
Q And --
(To the Court): I'm sorry; go ahead, your Honor.
THE COURT: No.
MR. BLACKBURN: Oh, I'm sorry.
BY MR. BLACKBURN:
Q And did you have the occasion to develop habitat conservation plans through the Austin office?
A Daily.
Q So overall, how many -- do you know how many habitat conservation plans you've actually been responsible for?
A Well, right before I moved to Albuquerque, New Mexico there was a project leaders meeting nationwide and I was informed by them that I had supervised more habitat conservation agreements than anyone in the Service. I have no idea if that's true or not, but I've done a lot. So -- and every one of them are different and that's the beauty of the flexibility for a habitat conservation plan.
MR. BLACKBURN: I offer David Frederick as an expert in endangered species and habitat conservation plans.
MS. ROBB: No objection, your Honor.

THE COURT: He'll be accepted as such.

THE WITNESS: Thank you, ma'am.

BY MR. BLACKBURN:

Q Now, one last thing, what awards have you been given?

A Numerous, Trout Unlimited Conservationist of the Year, the second highest award in the Department of Interior, Meritorious Award, but the one I'm really -- and all kind of quality performance awards, outstanding performance awards, an Exemplary Act Award where I did first aid on a Corps of Engineers' employee, just numerous, and probably --

Q Which one are you most proud of?

A The Chuck Yeager Award.

Q And what's the Chuck Yeager Award?

A This is given by the National Fish and Wildlife Foundation. Chuck Yeager was on the board of the National Fish and Wildlife Foundation. He was one of my heroes in my life and to receive that award, I was very proud of that.

Q And I don't know if you heard Andy Sansom --

THE COURT: We just had somebody with that.

MR. BLACKBURN: Right, he also had won the Chuck Yeager Award.

THE WITNESS: Mr. Sansom and I have known each other for a lot of years.

THE COURT: Really?

THE WITNESS: Yes, ma'am.

BY MR. BLACKBURN:

Q Now, you've been sitting here throughout this trial and you've heard a lot of, lot of things and I'd like to take you through some documents that have been discussed and I'd like to pull up, if I could, Species Spotlight Action Plan.

(Pause)

There we go, Plaintiff's Exhibit 25. And let me just start by asking you some general questions about this.

You know what a recovery plan is, do you not?

A Yes, sir.

Q And we have had extensive discussions about the Recovery Plan. We've had testimony by three members of the Recovery team. Is the Species Spotlight Action Plan different than the Recovery Plan?

A Yes.

Q What's the difference?

A The -- a recovery plan is a guide document. And I'm putting this in my own words. It's a guide document. You try to ingest as much scientific information about the species, you try to do future plans for the particular species, and hopefully you set a benchmark for positive actions for the species.

The spotlight action plan was a thing devised by the Service to put a spotlight on essentially iconic species and try to judge what they could do and how fast they could do it

to protect the welfare and also the habitat of said species.

And when I was within the Service I'd never seen one of these. Since then I've seen several that the Service has produced. This is really pinpointing issues and problems and possible solutions on that particular species. I think it's a well --

Q It's a what?

A I think it's about time the Service did this to spotlight certain species and try to fix issues.

Q I'd like to hone in on the -- now, this is the Spotlight Action Plan for the whooping crane.

A Yes.

Q And I'd like to tie into threats, which would be saying the first paragraph with "A" under it and go all the way through "A" please.

Is destruction, modification, or curtailment of habitat or range the type of issue that you were involved in under the Endangered Species Act?

A Yes.

Q And how do you interpret this document, particularly with regard to A.2?

(Pause)

A I think A.2 lays out a problem that if not fixed or ameliorated somehow that ultimately it will affect the survival of the whooping crane.

Q And they lay out here that essentially decreases in freshwater inflows from water diversions and reservoir construction add to the following threats, right?
A Yes, sir.
Q And that would include reduction in available food items. And they identify in this Action Plan two food items. What are they?
A The wolfberry and the blue crab.
Q Secondly, they state that there are increased intervals when winter marsh salinities exceed the threshold of 23 parts per thousand decreasing the availability of fresh drinking water for the cranes, correct?
A Yes, sir.
Q Now, this is an official statement of the Fish and Wildlife Service, is that right?
A Yes, sir.
Q You've listened to the testimony here, do you agree with that assessment?
A After listening to the experts I would say yes, by all means.
Q Now, how would one go about crafting a habitat conservation plan to address this stuff? What do you need?
A Well, I've heard comments during this week about adding to the National Wildlife Refuge more land and a thought occurred to me the other day that that would be good, but without

freshwater inflows to the bay it doesn't matter how much habitat you have, you have to keep the salinity levels in a lower fashion than 23 parts per thousand. And I think a combination of both, keeping the salinity levels to a level that will not harass or harm the whooping crane, is paramount.

Q Now --

A Secondarily, yes, it would be great to have a much larger refuge because the whooping cranes are expanding greatly.

Q In terms of the threats that are identified on this Species Spotlight Action Plan, land's not identified as an issue, is it?

A No, sir.

Q Fish and Wildlife Service hasn't said we need more land, Fish and Wildlife Service has said we need water?

A Oh, there's no doubt about that.

THE COURT: The Guadalupe River, okay, is going to get land, so not to worry.

MR. BLACKBURN: Not to worry.

THE WITNESS: But really the key to this whole thing, if I may expand, is the water. And just like the spotted owl in the Pacific Northwest, water salinity levels affect much more than the whooping crane and its food source, it affects everything in the estuary. So to me the number one thing in the plan is to work out something that during stressful times in the estuary there can be an increase in the inflows to keep

these levels lower than they are. And from what I'm hearing this year they're extraordinarily high because of the drought, so….

BY MR. BLACKBURN:

Q And -- now, to get a habitat conservation plan accepted, let's say I'm a water diverter, I have some fear of in the future being prosecuted, I want to try to take care of that fear, I prepare a habitat conservation plan and you're helping me on this --

A Okay.

Q -- and what do I need to do? What do I try to target my plan if I'm going to submit it to the Fish and Wildlife Service?

A I'll answer this in two ways, if I can. First, there's always an alternative that can be done if people work hard enough at it. In this --

THE COURT: So what's the alternative here?

THE WITNESS: It would be to supply inflows when needed to the estuary, more inflows to the -- more volume of inflows to the estuary. Secondly, by the time anybody figures out the salinity levels right at the marsh in my opinion is too late. There should be monitoring of the estuary from outside in so you know when it's reaching critical problems. That would be the first two things that I would look at.

And again, I don't purport to know how water delivery

to the bays, that's somebody else's expertise, but there is water available and impoundments, et cetera, and during high salinity levels, as these monitors pick it up in the bay, I do believe freshwater inflows could be adjusted to overcome that. So that would be my first two shots.

BY MR. BLACKBURN:

Q Would that be something that would be required --

A Okay.

Q -- to be developed and worked out and submitted if, in fact, the threat is freshwater inflows?

A Yes.

Q I mean could I come in and offer a bunch of land to address freshwater inflows?

A No, the number one priority here is to bring more freshwater inflow to the estuary.

Q And would the habitat conservation plan need to identify how that is done?

A Yes. And again, the applicant in this particular case knows more about water transfer than I would ever hope to know, but the U.S. Fish and Wildlife Service will work with them in various tests they could do, a whole bunch of things to know when and when -- I mean when and where to supply that bit of water. After that other alternatives are always possible.

Q And did you hear the testimony by Mr. Sansom that preceded you when he talked about a recovery implementation plan being

worked out to be submitted, I presume, under the requirements of a habitat conservation plan?

A Yes, that's -- you can have an implementation plan, in fact that's one of the first steps, if the applicant desires to do that. Again, it's a voluntary effort by the applicant. However, I cannot foresee in any habitat conservation plan for this part of the world that would not include an increase in freshwater inflows.

Q But it's going to be hard.

A Why?

Q Well, I mean I'm hearing, all I'm hearing is how hard it's going to be.

A Anything worth doing is usually hard. The key is you're trying to keep the economic gain, and in this case it didn't sound like there's a lot of economic gain to the State agency, however for the people that are withdrawing water from the water sources, this would give them surety that they will continue to have it. If a habitat conservation plan is not done and a take -- and I disagree with the statement, by the way, and I'm about to get to that right now -- I tried to do habitat conservation plans before a take occurred.

Q I was going to get to that --

A Okay.

Q -- but go ahead, go ahead and talk about it right now, because that's important.

A The reason is it does not put the applicant at risk. At least -- I'm just talking personally, if I see a problem coming up, whatever project, I would go to the leader of a development of some sort and talk to them that you're getting very close to a take situation. I don't like waiting after the fact on that and it should be our responsibility to discuss this with any applicant beforehand and let them know, because you fall immediately if a take occurs into Section 9, which is a law enforcement issue, and nobody wants that.

Q Now, I'm kind of curious. You say you'd do a habitat conservation plan prospectively.

A No, I'd go to the -- I'd go to we'll say TCEQ and I would say I believe you're getting very close to being -- a take being called.

Q Would it be useful for someone to get advised that there's a real risk of a take?

A Yes. I think so. I think that's just again the start of a partnership. I do not --

THE COURT: Has anybody in the Fish and Wildlife Department ever advised TCEQ that there's a risk of a take with the low flows?

THE WITNESS: I have no knowledge of that, ma'am.

MR. BLACKBURN: I have no knowledge of that either, your Honor.

MR. WILLIS: No.

THE COURT: Okay. No knowledge or no definitely?

MR. WILLIS: I think we had --

THE COURT: I think we'd all know about it, wouldn't we?

MR. BLACKBURN: I think --

MR. WILLIS: Well, I can't speak definitively, but you heard the executive director yesterday specifically say that that had not occurred in his position.

BY MR. BLACKBURN:

Q Now, habitat conservation plan, it could be developed under a partnership arrangement and with stakeholder participation?

A Yes.

Q Have you ever participated in one like that?

A Yes.

Q Where?

A Washington State.

Q How is it done? You're smiling. I'm not sure --

A No --

Q -- I like that, but --

A You put 30 people in a room, all with different wants and whatever. Sometimes --

THE COURT: So it's herding cats?

THE WITNESS: Yes, your Honor.

Sometimes it's better to -- the decision maker is the

applicant and the decision maker, if the habitat conservation plan is good enough, is the Fish and Wildlife Service. So those two have to -- those two groups have to be side by side. Stakeholders and other things, panels, can help, but it usually delays the process. I'm just speaking from my own experience. Some large habitat conservation plans there was several committees, groups, stakeholders all involved in those things, which is wonderful, but it usually delays the process.

My average habitat conservation plan on large HCPs was 18 to 24 months. Smaller ones, it wasn't. Or if the applicant really pushed, it could be a lot lower. The Fish and Wildlife Service would like to get habitat conservation plans done within a year, smaller ones even quicker than that. But when you think about public participation, federal register notices, NEPA compliance, Section 7 compliance, that's all wrapped up in there, it takes a little bit of time.

BY MR. BLACKBURN:

Q But it is a comprehensive process and ultimately does it protect the whooping crane?

A Yes, and it also protects the applicant.

Q Now, are you an environmentalist?

A No, sir.

Q What are you?

A I'm somebody that can figure out a strategy to fix a problem and work toward that end. I believe environmentalists

are good minded people that work very hard in trying to save something they very much believe in; however, they really don't know how to fix it. And I think professional biologists, hydrologists, whatever you want to use, can usually formulate a plan to fix a problem.

Q But the stakeholder involvement would include environmentalists?

A Oh, Lord, yes. In fact I can't --

Q So would it be fair to say that you consider yourself a professional?

A Yes.

Q And there's a role for professionals, there's a role for stakeholders, and all of these have to come together?

A Yes.

MR. BLACKBURN: Just a minute, your Honor.

(Pause)

I have no further questions, your Honor. I'll pass the witness.

THE COURT: Thank you.

CROSS EXAMINATION

BY MS. ROBB:

Q Good morning, sir.

A Good morning.

Q Now, you left the Fish and Wildlife Service in June of 2006, five years ago, correct?

A Yes, ma'am.
Q And you're not speaking for the Service here?
A No, ma'am.
Q Did you have to get permission to testify in this case?
A No, ma'am.
Q And you're here in your individual capacity?
A Yes, I am.
Q You worked in the Austin field office from 1998 to 2002?
A Yes, ma'am.
Q During that time in Austin were you familiar with the Aransas Refuge?
A Yes, ma'am.
Q Was the refuge in your geographic area of responsibility?
A No, ma'am.
Q Did you ever talk to the refuge about concerns that you might have had about a lack of freshwater inflows due to diversions?
A Actually when I was -- if I may, when I worked out of the Houston office we talked to the refuge several times about freshwater inflows, or they talked to us about it. And it wasn't an urgent thing at that -- I mean at that time in the 80s.
Q What was the nature of the conversation that you had --
A Well --
Q -- that they gave to you about flows?

A They were trying to do predator control at night on some of the predators, hogs especially that were taking over, so my background is a shooter, I would go down there and help them do that and then we'd help the boy scouts with their events with hog meat. But in those times we would talk about -- there wasn't -- I don't know how to put this correctly, but salinities would come and go, you know, short term, but they were concerned that the salinity levels were getting longer in duration and that's about as far as we went at that time.

Q And you were concerned about predator control at the refuge?

A Of course.

Q And there was a problem in place that you participated in?

A It was pretty much ad hoc. The population of certain predators would get to a point where they were concerned about the safety of the species, I mean just even migratory birds, and a few of us were -- had a background in accuracy, I guess is the best way to put it, and we'd come down ad hoc when the refuge would call and try to take out some of the problems, especially hogs. Hogs on the refuge was really tough, very though.

Q Yes, we've seen some pictures of them. And your role in the process was to shoot the hogs?

A As quickly as I could.

Q And during that time you were in Austin were you aware

that crab trapping was going on on the refuge area?
A I did not.
Q Have you worked on an HCP since 2006?
A I've advised applicants on HCPs.
Q Let's pull up Plaintiff's Exhibit 25, the Spotlight Action Plan. Were you here when Mr. Stehn testified that he's the primary drafter of this document?
A Yes.
Q And your opinion on blue crab and wolfberry importance to the whooping crane is based on this document?
A Not only this document, but personal interviews with Fish and Wildlife employees out of the Corpus Christi office.
Q So your opinion is based on the opinions of others?
A Yes, ma'am.
Q You haven't personally studied blue crab and wolfberry to determine their importance to the whooping crane?
A No, ma'am.
Q And your opinion that more inflows are needed is based on the opinions of others as well, correct?
A Yes, ma'am.
Q Please take a look at Plaintiff's Exhibit 25, and you and Mr. Blackburn focused on A.2, but I'd like you to take a look for a minute at A.1, the first item under the list of priorities.
A Thank you for expanding it.

Q It helps, doesn't it?
A Yes, ma'am.
Q The technology is amazing.
The first item on that list is habitat, is it not?
A Yes.
Q And it says that expanding human developments are causing loss of migration and winter habitat needed to meet recovery goals for downlisting or delisting.
A That's true.
Q Water is not in that first factor at all, is it?
A No, ma'am, but I don't know whether they were ranked in importance.

THE COURT: I'm sorry, but I don't read that that way. Expanding human developments consume water, so I don't take that as an end result that that's not included. I mean that sort of speaks for itself, I think, unless you can tell me otherwise.

MS. ROBB: Well, your Honor, perhaps I should talk with --

THE COURT: Sounds good to me.

MS. ROBB: -- Mr. Frederick a couple of more questions and then -- and we will see where -- yes.

BY MS. ROBB:

Q Mr. Frederick, you see that there is a numerical list here of factors of present or threatened destruction, modification,

or curtailment of habitat or range, do you not?
A I see it mentioned, yes.
Q Yeah, and the first item on the list mentions winter habitat needed to meet recovery goals for downlisting or delisting?
A The way I -- I took that two different ways, if that's what you're asking me, to explain those?
Q Okay.
A Winter habitat needed, to me the first thing that I would look at is the freshwater inflows is keeping the food supplies to the territories, that would be my first thing on winter habitat. Also, winter habitat all over the refuge and sundry places, to include possible needed habitat in the future. The winter habitat to me is the most critical thing would be the intersection of the marsh and its food base. From the experts that I've heard all week, that's what I would get. So when the food base disappears the winter habitat has to be expanded and the cranes have to leave that habitat, their normal habitat, and fly inland or other places to find to find a food source in fresh water.
Q And that opinion that you just stated is based on the testimony that you heard this week from other TAP witnesses?
A Testimony and also documents that I read by the Fish and Wildlife Service, which was the recovery plan, the spotlight document, and also personal conversations with the experts.

Q Okay, thank you.

You said that you worked on the spotted owl habitat conservation plan, right?

A Well, for several companies and state and -- yes.

THE COURT: Was one of those -- did you say one of those was called the Plum Company?

THE WITNESS: Plum Creek Timber Company.

THE COURT: Are they going -- are they in Maine now?

THE WITNESS: Yes, and I think they're in eastern Texas. At least they were for a while.

THE COURT: There's a huge habitat controversy going on with Plum Creek now in part of Maine.

THE WITNESS: They were not -- I think they became our applicant kicking and screaming, but once we developed the habitat conservation plan they were very --

THE COURT: Just that name sounded very familiar.

THE WITNESS: Yeah, it is. They're all over. I mean they really are.

BY MS. ROBB:

Q I know --

THE COURT: Moosehead Lake, I think.

THE WITNESS: I hadn't heard of that one, your Honor.

BY MS. ROBB:

Q About what time range were you working on the spotted owl habitat conservation plan, do you remember?

A Plan or plans?
Q Plan.
A Well, the habitat conservation plan, there were several of them. There was numerous habitat conservation plans.
Q When did you start working on the spotted owl?
A In 1980 -- no, actually 1990 we started. And most of those took, like I said, between 18 and 24 months, some of the larger ones longer.
Q And what was your role in that?
A Because of the controversy and the I hate you, you hate me scenario that had started, I was trying to broker a gap with a handshake, let's work together, and that started early. And I had a staff that was large enough that we could be doing several large HCPs, habitat conservation plans, at a time. But getting through the internal politics of various companies took a little time and that was my job and also reviewing all the stuff and signing off on it. But getting together without a hateful attitude by both sides was the starting point for most of the Pacific Northwest actually.
Q And the trigger for the work on habitat conservation plans for the spotted owl was a finding of take, wasn't it?
A It could be. There were -- several of the largest habitat conservation plans did not make a take call. I've made thousands of them over my career that did not make a take call, because that puts the onus of Section 9 of the Endangered

Species Act in the forefront. That's the last thing that I wanted to do. We had -- we might have lost individuals in the early day, I was not going to make a take call until I tried to explain this to the heads of various companies, state officials, et cetera, who was asked, and hopefully they would come through the door as an applicant, and in most cases they did. If I would have made a take call immediately, which was my want, I mean that was my first instinct, I would have lost a lot of the applicants because there was such consternation at that period of time.

Q Are you aware of any litigation that preceded the habitat conservation plan work that you are describing that you did?

A Yes. Judge Dwyer forced the Forest Service to do this job under the law, which caused my office a great deal of workload because of Section 7, and Section 7 essentially says that no federal agency can jeopardize or adversely modify a critical habitat of an endangered species. So we were working on two fronts. And what we finally did, we became partners with the U.S. Forest Service, in fact I brought several of their employees into my office to deal with Section 7s, help write them, because I have a forestry background somewhat, but my biologists didn't, so we worked together to get through Section 7. And again it was a partnership. We had to get over several hurdles in the early days, just like we did with the applicants for the HCPs on the private sector. And we did.

Q And, again, Section 7 is the consultation provision --
A Yes.
Q -- of the Endangered Species Act, correct?
A Right.
Q In the litigation that you're aware of about the spotted owl there was a finding of take, wasn't there?
A Yes.
Q And the spotted owl lived in an old growth forest area, right?
A Yes.
Q And the logging companies were cutting down the trees that the spotted owl lived in, correct?
A Right.
Q And the take that was caused by this, the direct cause was the logging, correct?
A Yes.
Q You also -- did you say that you worked on the habitat conservation plan work for the marbled murrelet too?
A Yes.
Q And --

THE COURT: The what?

MS. ROBB: The marbled murrelet.

BY MS. ROBB:

Q Why don't you tell the Court what a marbled murrelet is?
A Your Honor, it is a seabird that nests up to 25 miles

inland on old growth forest. It's about the size of a robin. The bird is very hard to identify in flight because its flight is so fast and erratic. But the cutting of the old growth again took out its nesting habitat because they live fairly close to the coast and their feeding is in coastal waters, so with the cutting of old growth it put them in jeopardy.

THE COURT: Thank you.

BY MS. ROBB:

Q And what was your role in the marbled murrelet habitat conservation plan work?

A Well, helping the applicants produce the science. A lot of these habitat conservation plans were for multiple species. This wasn't just the spotted owl; there was marbled murrelet, wolves in some places, bears, grizzly bears, et cetera. So these were multiple species and multiple candidate species that had to be worked through. But what this ultimately did when these plans were finalized and approved and all the NEPA documentation, Section 7 documentation was inside that plan, it gave surety to the applicant.

And at the same time we were working on a thing called the no surprises policy. Once these things are done, and if an applicant takes in all the candidate species as well, when the HCP is done they will be required to do nothing but what they have put in their plan. If they don't take on the candidate species and other species they are at risk for a

species being listed and they're not covered. So it was the applicant's decision on all of that.

Q Now, are you aware that in the marbled murrelet there was also litigation?

A Yes, ma'am.

Q And there was also a finding of take of the marbled murrelet --

A Right.

Q --before the habitat conservation plan work began, correct?

A Yes.

Q The marbled murrelet also lived in old forest trees?

A Yes, ma'am.

Q And the logging companies were cutting down the trees that the marbled murrelet lived in, correct?

A Right.

Q So the take that was caused by and was a direct result of the logging companies cutting down the trees, right?

A There was adverse modification of habitat.

Q And you mentioned the Forest Service in the spotted owl case, was Fish and Wildlife Service involved in that as well?

A Honestly, I don't remember that. And that would have been up to our solicitors, or Interior's solicitors, and I don't remember that aspect of it.

Q Do you recall whether Fish and Wildlife Service was

involved in the marbled murrelet case?
A I think so. I believe because the since had improved and we supplied scientific evidence on this type of stuff.
Q Now, when you were talking before with Mr. Blackburn you made the distinction between habitat conservation plans that are done before a take actually occurs.
A Are started before.
Q Right.
A Started before a take.
Q Right. And that is usually when a development -- that's usually when a development is contemplated and the developer is seeking permits for building on property, isn't that right?
A It can be for anything, including this court case. You know, there's been no decision that I know of yet. There will be somewhere down the line, but I don't think that there has been a decision by the Fish and Wildlife Service on a take call. But the key to this is is that's why I think the beauty of this court case for both sides; it gives a chance for everybody to agree on something. You know, that's somebody else's decision. But hopefully this will be somehow or another taken care of before a take call actually occurs.
Q In your experience a number of the habitat conservation plans that you've worked on have come out of a developer looking to get permits for wetlands and the NEPA process is invoked and endangered species are identified on the property

and the question of potential take of the endangered species comes up, isn't that right?
A Yes.
Q And --
A But I wouldn't say most, I would say part of the HCPs I was involved with.
Q So some of them?
A Yes.
Q And, of course, you also worked on actually some very high profile endangered species cases that had gone through litigation and a take was established, correct?
A Yes.
Q That we talked about, like the marbled murrelet and the spotted owl.

The habitat conservation plans, you mentioned that the Fish and Wildlife Service doesn't do the plan, that it's the applicant that does it, isn't that right?
A That's true.
Q And that's a voluntary process that the applicant comes to, correct?
A Very much so.
Q And the habitat conservation plans are largely done for the purpose of applying for an incidental take permit?
A Yes.
Q And the habitat conservation plan is simply one aspect of

receiving authorization for an incidental take permit?
A It's the main aspect for that. Like any federal agency, you have to go through a NEPA process. Sometimes it's a categorical exclusion, sometimes it's an environmental assessment with a FONSI, finding of no signifi -- signi -- I can't get that word out -- significant impact, or a full blown EIS. And one thing that we did start in the early days during the owl scenario was working literally in parallel with an environmental assessment on EIS building, because a lot of the same information that's inside a habitat conservation plan, they marry up pretty easily. And that's not -- the reason that was done is not to waste time, because time is money to folks.
Q So the habitat conservation plan doesn't protect against a take, it actually serves as a tool to obtain authorization for a take?
A Right. What most people do not understand about a habitat conservation plan, an incidental take is only given when an applicant is doing a normally lawful project, or whatever you want to call it. An incidental take or an incidental circumstance means it was not planned for but it was probably going to happen during a construction phase, a lack of water phase, or whatever. So it protects the applicant from something that they did not plan for. The project wasn't designed to harm anything; it just is going to happen because of the way the project is run.

Q It authorizes take incidental --
A Right.
Q -- to otherwise lawful activity?
A Right. And there's usually -- on a big project there's usually a limit of what that take is.
Q Right. So if a species population is growing and no take has occurred you don't need an incidental take permit, do you?
A Let me put --

THE COURT: Would you say that again?

MS. ROBB: If a species population is growing and there's no take has been found, no take has occurred, you don't need to get an incidental take permit in order to pursue otherwise lawful activity.

THE COURT: I don't think that's what he said.

MS. ROBB: I'm asking him if he agrees with that.

THE WITNESS: Oh, she's asking me a question --

THE COURT: Oh.

THE WITNESS: -- your Honor.

THE COURT: Is that a fact?

THE WITNESS: Well, let me categorize this. If I was an applicant, and we'll just use this case, and I could be charged with a Section 9 of the Endangered Species Act it would behoove me as an applicant to seek an HCP because it would take that onus away from you and you could run your normally lawful activity. And the law within Section 10 is explicit about

minimizing and mitigating to the maximum extent practicable for the species and that's a judgment call by the applicant. But if you don't get one, and I think Mr. Sansom was correct, you have a problem, possible problem in the very near future of law enforcement getting involved big time and that can be very expensive and hurtful. And that is what the HCP is trying to eliminate, completely eliminate if possible. It is so flexible usually things can be worked out.

BY MS. ROBB:

Q But you would agree with me that if -- in order to pursue an incidental take permit the threat of take must be imminent?

A Are you asking my opinion on this particular court case or --

Q No, I'm asking you about when people seek incidental take permits.

A For me in most cases that was true, because like in a logging situation it's going down as we, you know, would be speaking.

Q Well now, in the logging situation you already had a Court finding of take of the spotted owl and the marbled murrelet.

A But you have to -- the Court might have said that because of the widespread cutting in habitat, but it was up to the Fish and Wildlife Service to declare it.

Q And that's the Fish and Wildlife Service's role in a habitat conservation plan effort, isn't that right?

A No, on any take situation it's the Fish and Wildlife Service that has to declare it.
Q They issue the incidental take permit, correct?
A Yes, usually.
Q Right. All right, well, would you agree with this, that it would be a lot less costly and a lot more expedient to reach an agreement on steps to protect the whooping crane here rather than a habitat conservation plan?
A I would agree to that wholeheartedly if an agreement can be reached for both parties.

MS. ROBB: Thank you. I have no other questions.

THE WITNESS: Thank you very much.

MS. ROBB: Pass the witness. Thank you.

REDIRECT EXAMINATION

BY MR. BLACKBURN:

Q Now, I want to talk a little bit about your style when you were at Fish and Wildlife Service. You were talking about basically trying not to declare a take to give some room for maneuvering, is that right?
A That was my style.
Q Did they have any doubt that you would issue a take finding if there was no action that was resolved?
A I didn't leave a lot of doubt when it came to that, because when I went to -- a lot of people didn't even know and that's why I hated calling take before I contacted these folks.

They didn't even know they were about to get into it and I thought it was, whatever you want to call it, a civil duty to at least inform them that they could be in problem.

Q So we've been using this term "hammer," you were the hammer?

A Yes, sir.

Q And you would basically say here's what I not only can do, I'm going to do?

A I didn't quite put it that way, but when I left --

Q There was no --

A -- they would ask me a lot of questions and I would explain to them that they have an imminent possibility of a take of an endangered species and here's what would happen if that take occurs.

Q And would they have ever given you the time of day if they didn't have the concern that you would declare a take?

A No.

Q I'm talking about a whole lot of cases, is that a commonality?

A Yes, because it has a time consumption, and again I'll use the counselor's terminology, like developers, they're on a milestone thing when it comes down to getting their development up with the banks and stuff like that, so they wouldn't do it unless they knew that a take would be imminent and the possibilities of what would happen after that take was

declared.
Q And it sounded to me that Ms. Robb was pretty much saying in all the cases that she was talking about that take findings were there before a habitat conservation plan was required. Does that work as well?
A Not really, not in specific cases, because every habitat conservation plan is literally tailored for that issue, that company, that habitat modification. It is definitely tuned for that one project.
Q So basically to come in and to basically address the risk of take is the easiest way to work the HCP process?
A In my experience, yes, sir.
Q But nobody wants to do it?
A I wouldn't say nobody. I've had probably 15, 20 percent, and I'll use Austin developers, I formulated a thing, we got most of the big developers in Austin together and I told them if they did things right by the law I would stand on any podium in the state of Texas and tell them their project was U.S. Fish and Wildlife Service approved and environmentally safe as it had to do with endangered species. And at one time Del Webb Development put up a sign on I-35, U.S. Fish and Wildlife Service Approved. Again, you're trying to make a partnership, not an adversary. And some of the developers took me up on my stuff and I did exactly what I told them I'd do.
Q Have you ever made a take call?

A Oh, Lord, yes, many.
Q So it didn't always work.
A No, no. It's just, you know, you try. It's you're dealing with people and you're dealing with economics. But Congress actually did something really good with 10(a)(1)(B) of the law, they allowed a flexible system where people could come jointly up with alternatives that would save a project as well as protect the species and without it the Endangered Species Act would be one of the most onerous things in the country. Congress really did do justice to the law, is all I can say, in my opinion.

MR. BLACKBURN: Your Honor, would you rather me not ask the witness about the ultimate issue in this case?

THE COURT: You mean whether there's a take?

MR. BLACKBURN: Yes, your Honor. From what he's heard, what he's seen, everything. Or would you prefer that question not to be asked?

MS. ROBB: Your Honor, this witness is not qualified to make a judgment about take. He hasn't been offered for that and he hasn't been established as that. He's going to give us a legal opinion on whether there's a take in this case?

THE COURT: I guess he's going to ask him for an opinion as his -- from his experience at U.S. Fish and Wildlife Service from what he's heard, does this constitute a take. And I think I might let him say yes or no, even though it's a

legal -- mine is a different standard, I think, than what theirs would be. I might let him do that and just you're welcome to impeach him on that, because I don't know what weight or credibility I would give to that.

MS. ROBB: Your Honor, these are the points I would ask you to consider. First, he's testified that his opinions about everything about the whooping crane --

THE COURT: Come from everybody else. I got it.

MS. ROBB: Right. And he doesn't speak for the Fish and Wildlife Service --

THE COURT: I got that too.

MS. ROBB: -- he speaks as an individual. And he has no expertise in the area in order to --

THE COURT: He's got expertise in declaring a take.

I'm going to go ahead and let him take -- take it -- testify, testify, I assume that's what he's going to testify to, I'm going to let him testify and then I'll weigh that, I'll take all that information into account when I weigh his testimony.

MS. ROBB: Well, I guess I'm --

THE COURT: He has no hands on experience with this.

MS. ROBB: I guess I'm unclear on exactly what Mr. Blackburn is asking him to talk about. Does he want Mr. Blackburn to talk -- does Mr. Blackburn want Mr. Frederick to talk about what goes into a determination of a take?

THE COURT: I think we know what Mr. Blackburn wants.

(Laughter)

MR. BLACKBURN: Your Honor, I think I'll --

THE COURT: I think there's no question.

MR. BLACKBURN: I think I'll solve this by just withdrawing the question.

THE COURT: There we go.

MR. BLACKBURN: And your Honor, if Mr. Frederick can be excused?

THE COURT: Ms. Robb, any questions?

MS. ROBB: No more questions, your Honor.

THE COURT: You don't want to ask him if there's a take?

(Laughter)

Thank you, you're excused.

THE WITNESS: Thank you, your Honor.

(Witness excused)

MR. BLACKBURN: And with that, your Honor, Plaintiffs rest their case.

THE COURT: Motions?

MS. SNAPKA: Yes, your Honor.

Your Honor, I'd like to make -- before I begin, I would like to make a motion on behalf of Defendants, however I would like to make sure there is legal court for Mr. Willis to add something if --

THE COURT: You're the Intervenor.

MS. SNAPKA: Yes, your Honor, GBRA. However, I think this motion would apply to all Defendants, except as Mr. Willis qualifies --

THE COURT: Well, you all -- I keep mischaracterizing you all as a Defendant.

MS. SNAPKA: That's correct. We're Intervenor and Defendants.

THE COURT: And in this case Intervenor, two Intervenors, and Defendants are aligned in this motion?

MR. WILLIS: We are aligned, your Honor, and although we -- based on our agreement with the Court earlier on we said to try to move --

THE COURT: We call them joint Defendants' exhibits, however you want to call them --

MR. WILLIS: Right.

THE COURT: -- but for the record I just want to make sure that this is -- there are two Intervenors and -- three Intervenors and the Defendants --

MR. WILLIS: Yes, and --

THE COURT: -- and this motion is on behalf of all of those --

MS. SNAPKA: Entities.

THE COURT: -- entities.

MR. WILLIS: And I -- she's asking leave of

your Honor after Ms. Snapka is done I may add a few additional points.

THE COURT: Thank you.

MR. WILLIS: Thank you.

MS. SNAPKA: He'll be doing cleanup for me.

THE COURT: Good.

MR. WILLIS: I doubt I'll need to.

THE COURT: Fourth batter.

MS. SNAPKA: Your Honor, Defendants and Intervenors come before this Court to make a motion for summary judgment on partial findings under Rule 52 --

THE COURT: Directed verdict.

MS. SNAPKA: My understanding is that --

THE COURT: Summary judgment?

MS. SNAPKA: Not a summary judgment, it's a motion for judgment under 52(c).

THE COURT: Okay. I thought you said motion for summary judgment.

MS. SNAPKA: Motion for judgment on partial findings --

THE COURT: Got it.

MS. SNAPKA: -- under 52(c).

This Court well knows that at this stage of the litigation in front of the bench that Plaintiff TAP must establish standing. They must establish standing by showing

evidence of associational standing by presenting members of TAP to show injury in fact, causation, and redressability. What is clear from the standing witnesses that were called by TAP is that there is no current economic injury. General concern about something that may happen in the future if things go awry isn't sufficient to establish economic injury. I think there's no doubt, as Mr. Kirkwood said, people are generally sad if any whooping crane dies. It's part of the cycle of life. And general sadness if there's a death is also insufficient to demonstrate injury in fact.

TAP alleges problems in the '08/'09 season. That season has been testified by the various witnesses as being unusual because cranes were moving around. However, every witness has testified that they were able to see cranes in the '08/'09 season. To the extent that the birds moved to the uplands, there were prescribed burns for a number of reasons, as was testified to by the witnesses, that caused them to move away from the marshes if there was difficulty seeing them because they were in the uplands.

Additionally, your Honor, '08/'09 was the year that Mr. Stehn put out experimental feeders, as demonstrated by the evidence. It was a one-year program and it was not continued further. And I'll be discussing the feeders shortly.

So the fact that there's no evidence that the actions of -- that the cranes moving to the uplands were caused, again

this is a proximate cause standard, by the actions of Defendants and Intervenors. There was -- there's evidence of burns, evidence of the feeders, and I want to discuss with the Court the evidence of --

THE COURT: That wasn't you.

MS. SNAPKA: That's fine, your Honor.

There isn't causation. The standard at this point in a bench trial is preponderance of the evidence. They must have met that burden by this point. And the Court is constrained by holding them to that standard. They must show that any deaths that occur -- or that the deaths that occurred in the '08/'09 season, particularly the 23 that are being claimed, are caused by the actions or the failure to act of the Defendants and Intervenors. We have alleged that the causation chain is too attenuated and I want to discuss the distinction --

THE COURT: I want to make sure I understand this. I don't think I have to worry about Intervenors doing anything. It's Defendants TCEQ that are accused of a taking. Is that right? So it doesn't matter to me. You all can take all you want and it's not going to apply here, because nobody's accused you of it. So we're just talking about TCEQ's motion for partial findings on standing.

MS. SNAPKA: But to the --

THE COURT: Is that right, is that where we are?

MS. SNAPKA: To the extent that I'm speaking for

them, I want to address the causation issue.

THE COURT: Well, but your people are not accused of doing any kind of taking or causing any kind of death, are they?

MS. ROBB: That's exactly --

MS. SNAPKA: That's correct.

THE COURT: Okay. So nobody's ever said that, right?

MR. BLACKBURN: We haven't said it, your Honor.

THE COURT: Okay, so why are we hearing a motion for partial findings as to those three Intervenors?

MS. SNAPKA: Because I'm speaking also for the Defendants with regard to causation at this point.

THE COURT: I think I really think that probably TCEQ ought to be making this motion by themselves, because it doesn't apply to anybody else I don't think.

MR. WILLIS: Your Honor, it's essentially --

THE COURT: And if she wants to speak for you, that's fine, but --

MR. WILLIS: We were essentially going to split the argument, because there are numerous reasons -- numerous bases or points for the 52 -- Rule 52 motion. And so we apologize if it made it sound like we were splitting between the Intervenors and Defendants.

THE COURT: Yeah, because Intervenors don't have any standing to talk about a motion for partial findings.

MR. WILLIS: It's more of a division of labor on this motion, your Honor.

THE COURT: Then you can do that, but just make it clear that you're speaking on behalf of TCEQ, because this has nothing to do with your client.

MS. SNAPKA: Thank you, your Honor, I will.

With regard to --

THE COURT: Yes, sir?

MR. FERNANDES: Could I be heard on that briefly, your Honor? With all due respect, the reason why we're able to intervene is because of potential harm to us. And so we're speaking --

THE COURT: I agree with you. I agree. But there's no reason for you to have any -- for you to have any concern about making a motion for partial findings, because that will come at the end of your case. Do I find that you have a -- that you've been harmed by this action or anything I'm about to do, if I do it?

I'm just trying to get the players straight and arguments straight.

MR. FERNANDES: I guess it's my under --

THE COURT: And you have -- you're here, all three Intervenors are here because I thought there was a possibility -- not from what I've -- right, because the Fifth Circuit said one of you, that there's a probability or a possibility of harm

to come to you that's not -- would not be adequately represented by TCEQ, which is why you are here.

MR. FERNANDES: And if a take is deemed to have occurred, that causes direct injury at this stage of the proceedings. That's why we believe it's appropriate --

THE COURT: I'm not -- I wouldn't be in any position to deem a take at this point, because I haven't heard all the -- I haven't heard the Defendants' evidence, unless you want me to make a judgment now without hearing your case.

MR. WILLIS: Well, your Honor, the way I understand I guess the point is that, similar to pretrial, to Intervenor Defendants filing motions for summary judgment, here after TAP has now presented their evidence and in the light most favorable to them both Defendant TCEQ, as well as Intervenor Defendants, still have an opportunity to request that the Court dismiss TAPs claims against TCEQ based on the legal arguments that we are making.

THE COURT: Okay, well that's all I want to hear from, is whoever wants to talk about dismissing the claims against TCEQ. It has nothing to do with dismissing anything against the Intervenors because no -- the Plaintiffs have not made a claim against the Intervenors. So I was getting confused with the terminology and that was clear that the terminology was wrong. I'm right and you're wrong.

MR. WILLIS: Yeah.

(Laughter)

THE COURT: Go ahead.

MS. SNAPKA: And your Honor, because this is a bench trial this Court has the ability to make a determination based upon a preponderance of the evidence. It's our position, if I may go forward, that that preponderance of the evidence burden that is held by Plaintiff has not been met.

To show causation it is a but for standard in a natural and continuous sequence of events. Here's what we have heard from Plaintiff.

Mr. Stehn testified, and this Court will well recall when he said -- we were talking about the ten-year life cycle, and he said "Bingo, that's it, that's the ten-year life cycle." The ten-year life cycle has nothing to do with the actions of TCEQ. The ten-year life cycle is simply a natural part of the life cycle of the whooping crane.

Mr. Kirkwood said the number one thing affecting mortality, whooping crane mortality, is rainfall or the drought. Again, these are natural climatological conditions over which TCEQ has no control.

THE COURT: Well, actually they have control over -- not over the rainfall, I mean it falls in the rivers, they have control over how much of it can get to the bays.

MS. SNAPKA: And I --

THE COURT: That was when he talked about it, that

rainfall.

MS. SNAPKA: Except that it is --

THE COURT: Not local rainfall.

MS. SNAPKA: I understand. But it's not direct, it's not directly the rainfall causes mortality. We look at a food source. And that's what I want to discuss very seriously here with the Court.

There is testimony in the record, interestingly from Mr. Mills, who grew up in the area, who talked about crabbing along the coast and there is an exhibit that talks about the general decline along Texas coasts regarding the blue crab. In other words, when the -- and it is Exhibit --

MR. TAYLOR: Defense Exhibit 393.

MS. SNAPKA: Defense Exhibit 393 shows the decline of the blue crab population along the coast.

THE COURT: That's what we were talking about yesterday.

MS. SNAPKA: That's part of what I was talking about, your Honor.

THE COURT: That would probably be enough.

MS. SNAPKA: And since 1980 there has been a decline. Now, your Honor, if it was shown that someone is picking up food and carrying it away, that is a direct cause. What I would like to show the Court is the evidence, and Mr. Mills talked about the illegal crab trapping, but I also want to show

the Court, because I'm not sure that it was really made clear, the extent of crab trapping on the refuge, on the wildlife refuge that is managed and enforced by Fish and Wildlife Services.

You'll recall that there was testimony about illegal crab trapping was occurring and Mr. Stehn, Fish and Wildlife employee, told this Court we looked the other way because of politics, because of politics.

If you'll show --

MR. TAYLOR: Defense Exhibit 6, page 90.

MS. SNAPKA: Blow that portion up.

In 2009, we're talking about the '08/'09 season, in 2009 the one day public trap pickup organized by Texas Parks and Wildlife on February 21st removed 1,237 traps from San Antonio and Aransas Bays, with a total of 1927 -- on the entire Texas coast. From the refuge, 1,237 traps in one day. That is absolutely definitely a cause of removal of a food source.

MR. BLACKBURN: I'm sorry, your Honor. She's misstating what this says. This is not the refuge. This is Aransas and San Antonio Bays. Aransas Bay goes all the way down to Port O'Connor -- I mean, I'm sorry, all the way down to Port Aransas. It is not the same area and it is a material mis --

THE COURT: That's true.

MS. SNAPKA: I'm sorry, I thought San Antonio Bay was the refuge. It includes San Antonio Bay.

MR. BLACKBURN: Right.

THE COURT: But that's not -- well, anyway, you're right --

MR. BLACKBURN: Thank you, your Honor.

THE COURT: -- Mr. Blackburn.

Go ahead.

MS. SNAPKA: There's no delineation between San Antonio and Aransas. But it's not 10 or 12 crab traps, is my point, it is far more than that, although there is no delineation about exactly how many was in San Antonio and how many was in Aransas. But it points to a serious and direct problem: if people are illegally picking up the food and carrying it off, then means less food for the whooping cranes. And if the Fish and Wildlife, Mr. Stehn, is looking the other way because of politics, that's a problem.

THE COURT: Everything's about politics.

MS. SNAPKA: I think that's right.

THE COURT: I'm here because of politics, if you remember.

(Laughter)

MS. SNAPKA: I also want to discuss with the Court the experimental feeding program. Mr. Frederick talked about he would come down and shoot hogs because they were so bad,

they were the absolute worst.

THE COURT: That exhibit that had the hogs around the -- the feral hogs around the feeder, is that what you want to show me?

MS. SNAPKA: That's the one I want to show you.

THE COURT: It's in my mind.

MS. SNAPKA: Okay. There's actually one that looks like a hog's -- this one is the one where the hog looks like it's chasing a whooping crane. That was the year that the experimental feeding program was going on, very destructive and --

THE COURT: And nasty.

MS. SNAPKA: And -- by Mr. Frederick's own testimony.

THE COURT: You think that's a matter for judicial notice.

MS. SNAPKA: And my point, your Honor, is there has been -- there have been allegations of increases in salinity and there has been discussion of decrease of blue crab, but what we have not heard is definite scientific evidence about how much water -- I'm sorry.

MR. BLACKBURN: There's no evidence that hogs eat the cranes.

THE COURT: No. Or chasing cranes.

MR. BLACKBURN: There's been no evidence --

THE COURT: They just mess up the ground.

MR. BLACKBURN: Yeah, there's just -- they're eating food at the same location. There's no testimony about --

THE COURT: I understand that. But don't interrupt.

MR. BLACKBURN: I'm sorry.

THE COURT: I can figure all this out.

MS. SNAPKA: And your Honor, there has been no evidence that any particular amount of water is going to grow any particular amount of crab. This is not an Edwards Aquifer case where you know if you suck the water out the salamanders are going to die or if we cut the trees down there won't be a place to nest. There is speculative testimony about there is more salinity and therefore we want less salinity.

That leads me to the redressability issue. There is no evidence that any of the remedies requested here would change the situation. And this isn't -- this argument is not intended to be a complete review; however, I want to point out to the Court that Mr. Trungale, who was brought by the Plaintiff, the Court will recall that when he did his three models, even the model where you take all the water and put it back in the river still has a result of high salinity levels, and therefore the redressability issue is one that has simply not been met in this case.

They say they need water. They don't say how much. They don't say what it would do. They --

THE COURT: I think 1.5 -- 1,500,000 is ideal.

That's what I heard.

MS. SNAPKA: And your Honor, that's -- they have not demonstrated that that is either -- that's ideal, but we don't know why. It's speculative. It would be nice to have that much water in there. But they have the burden of showing this Court that is a redressable problem. They have not --

THE COURT: No, I understand that.

MS. SNAPKA: They have not done so.

Finally, your Honor, and I want to briefly discuss the take issue. If this was a poor -- a food stressed season, '08/'09 was a food stressed season, then there was discussion about there would be a delay in migration. There was no delay in migration, but there was a delay in molting. What we heard was testimony that molting is variable from bird to bird. We would hear that there was impaired fertility. And within the Court's -- evidence available to the Court there is a report from Mr. Stehn that said he initially thought 79 percent success and he thought that was really good. As it turned out, in the '09/'10 season there was actually 86 percent nesting success. There was no impaired fertility.

And, your Honor, the fact that there were some cranes that died, there is no evidence that any crane suffered from dehydration, there is no evidence that the cranes died because of malnutrition. We know that there is a cycle of life. Cranes will die. They will be subject to predation. They will

have injuries. They will get diseases. These are just part of the natural things that occur. And, your Honor, in 2009/2010 the habitat was greeted with the excellent news that an unexpected 17 white plumaged cranes came back and they were very happy about that.

Now, I understand that Mr. Stehn does the very best job that he can in counting and reaching his mortality numbers; however, if we are to believe that 17 cranes unexpectedly showed up then we have to either believe that the food stress, as alleged by TAP, is somehow good for cranes because it results in good mortality, which doesn't make any sense, or that the whooping crane mortality was over estimated. We believe that the whooping cranes were not correctly counted because of the movement during the season and they were counted more accurately when, as Mr. Stehn said, he increased his range of flight the next year and counted more cranes. Mr. Stehn's statement where he says during his counting cycle that he has no faith in the accuracy should give this Court pause in decision -- in the decision to declare a take.

At this point, your Honor, we would urge that they have not met -- it's not a scintilla at this point, it's a preponderance of the evidence burden of proof. TAP has not met their burden of proof, either on a standing on those elements or a take.

At this point I would like to defer to my counsel,

Mr. Willis, for completion.

THE COURT: Thank you.

MR. WILLIS: Your Honor, I'm just going to touch on a few other subjects briefly.

Your Honor, there is -- back to the issue of causation, there has been virtually no -- completely insufficient evidence to support Plaintiff's position that the actions of TCEQ, all considered legal actions, everything that they've done, even by the own testimony of the Plaintiff's witnesses, were considered within the limited statutory authority of TCEQ, but there's been no testimony that would trace the legal statutory authority actions of TCEQ to any potential harm done to TAP. It's fairly straightforward. There's no need to go back through the evidence on it. Our position is that nothing supports that on a chain of causation, your Honor.

Also on redressability, the only evidence that you heard from TAP regarding whether or not TCEQ has the legal authority to essentially curtail certificate of authority -- or certificate of adjudication water right holders is that of Mr. Soward, who said he believed that that was within TCEQ's authority at the present time; however, you'll recall that he first recognized that those were property rights under property law. His only statutory authority to support his argument that he believed that TCEQ, ignoring constitutional safeguards,

could essentially go after the water of those certificate of adjudication right holders were -- he cited them, but they were under the Texas Water Code and then a general statute giving general authority to the TCEQ. That's not sufficient evidence to overcome the long standing recognition under property law that they have a legal property -- a legal right to the property use of that water. So without that it completely takes away TAP's argument of redressability on this issue, even should the Court find that there was a take.

Two other things quickly, your Honor. Under the Eleventh Amendment essentially --

THE COURT: You want to mess with that?

MR. WILLIS: No.

THE COURT: Go ahead, I'm kidding.

(Laughter)

These are all prospective relief and not damages.

MR. WILLIS: Yes. Exactly, your Honor. That's primarily what the source of our argument is, both under the Tenth -- I mean the Eleventh Amendment regarding -- what they're asking is essentially even though a state agency is doing everything within their legal authority, they're asking -- if I can get this argument correctly --

THE COURT: I don't think they ask any things that cost money. Is that your argument?

MR. WILLIS: I'm sorry?

THE COURT: Asking you to do things that would cost significant money?

MR. WILLIS: No, it's not the significance of the money; it's the waiver of sovereign immunity. Essentially --

THE COURT: I think I did a summary judgment on the Eleventh Amendment thing.

MR. WILLIS: I didn't think it was granted. Oh, you addressed it in the summary judgment, you're right --

THE COURT: I did.

MR. WILLIS: -- your Honor.

THE COURT: But this does not -- this action does not involve, in my opinion, the Eleventh Amendment.

MR. WILLIS: Okay. I did not realize that --

THE COURT: I think I said that.

MR. WILLIS: -- but essentially what we're really doing is talking about the retrospective aspect --

THE COURT: Because you had a motion to dismiss based on the Eleventh Amendment that I denied.

MR. WILLIS: Yes.

THE COURT: I mean I don't think anything's changed, there's been any change in the evidence since I did that.

MR. WILLIS: No, just I guess --

THE COURT: I'm sure you read that every night.

MR. WILLIS: I -- well, it was my understanding you denied it based on the different standard, both pretrial --

THE COURT: No, not different standard, just the type of relief that was requested.

MR. WILLIS: Okay, fair enough.

THE COURT: If they had sued you for money damages I would have dismissed it under the Eleventh Amendment, but prospective relief or injunctive relief doesn't implicate the Eleventh Amendment sovereign immunity.

MR. WILLIS: Okay.

THE COURT: I don't think.

MR. WILLIS: Briefly I'll touch on the Tenth Amendment issue, your Honor, which was essentially even under the *Strahan* Court finding that -- and under *Strahan* that the Court may not direct a state or an agency of the state to develop a particular regulatory scheme that would essentially enforce a federal policy. And that's the concern, is that what TAP's requesting is that the Court order state officials to alter the activities over which they don't have the legal authority, essentially the state does not have the legal authority --

THE COURT: *Strahan* found they did.

MR. WILLIS: I'm sorry?

THE COURT: *Strahan* found they did, I thought.

MR. WILLIS: Well, *Strahan* found that they were able -- the Court was able to order state officials -- I should have had Mr. Hulme make this argument --

THE COURT: I understand your argument.

MR. WILLIS: Okay.

THE COURT: I do. I understand that you're having trouble enunciating, but I understand your argument is that the federal -- that the Court should not have authority to order a state agency to comply with federal regulations. I think that was the *Strahan* argument. *Strahan* said as long as you have -- the State has the authority of granting licenses, I think it was lobstering or something, granting fishing licenses, as long as they have that authority then the Federal Court does have the authority to say yes, you need to bring that into alignment with whatever it was, endangered species, it wasn't that, was it?

MR. WILLIS: Well --

THE COURT: Endangered Species Act.

MR. WILLIS: I think it's probably briefed much better than I'm doing here in our Motion for Summary Judgment and I guess we'd rely on that briefing even for this motion here.

THE COURT: Thank you. I remember it. I mean we're on the same page. We understand -- I mean I understand your argument.

MR. WILLIS: Well, I guess with that, that's all we've got at this point, your Honor.

THE COURT: Thank you. And you know what I'm going

to do with those motions?

MR. WILLIS: Take them under advisement?

THE COURT: I am carrying them forward, which is what you all expected, I'm sure.

MR. BLACKBURN: Your Honor, may I bring up another matter?

THE COURT: Yes.

MR. BLACKBURN: There's been a bit of a glitch in otherwise good communication that we've had between Plaintiffs and Defendants and we were informed by TCEQ who the next witness was, but we had information that any other witness would be called today. And I am informed that there are witnesses here, who are, frankly, excellent scientists, that we are unprepared to cross examine and I was wondering -- you know, on the one hand I'm willing to do it.

THE COURT: I think you better get on it.

MR. BLACKBURN: Okay. Could we possibly have a little 15, 20 minutes extra to let me -- this is when I'm going to come and whine for a few --

THE COURT: You're just so, you guys are so whiney.

MR. BLACKBURN: I know.

(Laughter)

THE COURT: It's the cold. It's the heat.

(Laughter)

It's the time. I'll give you an hour and 45 minutes

for lunch.

MR. BLACKBURN: That would be excellent, your Honor.

THE COURT: This is probably a problem of your making, because you said you expected to be concluded by later afternoon.

MR. BLACKBURN: I know, it is.

THE COURT: So I made sure -- you know, I talked to them early to make sure they had somebody here to come on, so….

You have the list of witnesses in order now for them?

MR. FERNANDES: Yes, and what we've been doing is at 6:00 o'clock each night we've been exchanging emails on who's coming on the next day.

THE COURT: Okay.

MR. FERNANDES: And frankly, like Mr. Blackburn says, it was one of those days where we forgot to send the list, they forgot to ask, and that's how we got to where we are today. So where we are today is --

THE COURT: Now we know.

MR. FERNANDES: -- we have one more witness who's coming on -- the State's witness is going to be the first witness. The second witness that we propose is Mr. Davis. Because he wasn't identified they have an objection to him. If I might propose something that might make sense so that we can use the afternoon productively, because I don't know how long that witness is going to go? I guess personally I've never

been involved in a case where's there's been so much discussion as far as the underlying case's potential remedies and -- but one thing that the Court had mentioned earlier, perhaps it might make sense for us to visit briefly in chambers about some of these ideas before we start putting on our case. I assume --

THE COURT: Actually my -- for over 17 years my rule is I never visit in chambers.

MR. FERNANDES: Okay.

THE COURT: Anything you say you say out here. I guess having -- and my staff can tell you, having been a product of State Courts where too much occurred in chambers that I just made a rule not to ever do it. So I'll be glad to talk to you up here at the bench with everybody here and anybody else that wants to listen can come up.

MR. FERNANDES: It's not a problem, I was just trying to figure out --

THE COURT: I appreciate that.

MR. FERNANDES: -- combined as a constructive way for us to use our time and open court will be fine as well.

THE COURT: But that -- you know, my emphasis on that intimates that I've already made a decision, which is not the case. I see a problem and I'd like for all of us to fashion a solution --

MR. FERNANDES: Yes.

THE COURT: -- whether it's increased land, increased freshwater inflows, see how it's possible, where the money can come from and what can happen.

I am reluctant to say there's a taking, I'll tell you that. On the record, off the record, any other way you want to do it. And it may be, it may be that I have to say at the end of the day that there's a taking. I would prefer that we all get together and see how we can come up with a solution, whether it takes years of oversight to do it, a couple of years to come up with a habitat conservation plan, to come up steering committees and everything else that would need to be put in place. Obviously we need to make sure that the stakeholders would participate. However you all think -- if you think it's possible, I'd like to focus on that. If you think it's possible, we'll go on another way.

MR. FERNANDES: I guess we're looking at next week, and obviously our case is going to be there is no take and that's what our evidence is going to be.

T**HE COURT:** Of course.

MR. FERNANDES: But the second aspect is going to address an issue that you raised earlier, and that is you'll hear from some of these experts in terms of if you're really truly focused on what's in the best interests of the cranes from their 30 and 40 years of experience dealing with these cranes, you're going to hear those opinions as well. So our

case is going to be focused on both aspects.

THE COURT: That would be great. Anything else -- I'll give you any kind of advisory opinions you want.

MS. SNAPKA: May we have a confidential bench -- confidential bench conference with all counsel?

THE COURT: Yes.

(Counsel approached Bench at 12:03 p.m.)

THE COURT: But I'll just telling you it's going to be on the record. I'll seal it, but it will be on the record.

MS. SNAPKA: Because we don't want the gallery to hear.

THE COURT: That's fine.

THE COURT RECORDER: Judge, can I ask instead of this we close the courtroom, because there's too many people up there with two few microphones.

MR. FERNANDES: We were about to take -- I'm assuming we were about to take a lunch break after you were through with this, your Honor.

THE COURT: It depends on how the people out in the gallery feel. Do you think -- all the interested parties, do you have a problem with me doing this, is it okay with you if I do this?

Ms. Scheurich, you're an interested party. Do you mind being cut out if might be in the overall interest of the cranes?

MS. SCHEURICH: Would you like us to leave?

THE COURT: I think that's what everybody's asking.

THE COURT: Thank you, Ms. Gano.

It's good to see you all, by the way, Ms. Scheurich.

(Courtroom observers exit courtroom)

MR. BLACKBURN: Well, the parties are now --

THE COURT RECORDER: It's the observers.

THE COURT: I don't know if there was media here.

MR. BLACKBURN: Well, let me --

THE COURT: I know that someone emailed -- someone called us last night from San Antonio and said the San Antonio paper was running daily copies.

MR. BLACKBURN: Excuse me just one second, your Honor.

(Pause)

THE COURT RECORDER: This is sealed from here on?

THE COURT: Sealed from here on.

(Sealed conference omitted from 12:05 p.m. to 12:11 p.m.)

(A recess was taken from 12:11 p.m. to 1:47 p.m.; parties present)

THE COURT: You may be seated.

Are you all ready?

MR. WILLIS: Yes, your Honor.

THE COURT: How are we proceeding?

MR. WILLIS: Your Honor, if you want we'll go ahead,

the State Official Defendants will proceed with their first witness.

THE COURT: Thank you.

MR. WILLIS: Your Honor, at this time the State Official Defendants call Todd Chenoweth.

TODD CHENOWETH, DEFENDANTS' WITNESS, SWORN

MR. WILLIS: Your Honor, Exhibit 297 is Mr. Chenoweth's CV that's already been offered and accepted into evidence.

THE COURT: 297?

MR. WILLIS: Yes.

THE COURT: I'm going to start a new -- hold up.

MR. WILLIS: Sure.

(Pause)

THE COURT: Go ahead.

DIRECT EXAMINATION

BY MR. WILLIS:

Q Good afternoon. Could you please introduce yourself to the Court?

A Your Honor, my name is Todd Chenoweth. That's two "D"s in Todd and C-h-e-n-o-w-e-t-h.

THE COURT: Thank you.

Q Mr. Chenoweth, what's your current employment status? Who do you work for?

A I work for the Texas Commission on Environmental Quality.

Q And your current position?
A Oh, in my current position I am actually special counsel to the deputy for the Office of Water.
Q Mr. Chenoweth, although we've posted your CV, it's actually --

THE COURT: Special counsel…?

THE WITNESS: Office of Water.

THE COURT: Thank you.

BY MR. WILLIS:

Q Although your CV is in evidence we will just run through very briefly just a quick summary.

First of all, run through your education background for the Court.
A I have a Bachelor of Arts from Texas A&M University, a Juris Doctorate from the University of Texas School of Law, and a Master's in public administration from the Kennedy School of Government at Harvard.
Q And also you've done some graduate work, course work in hydrology as well?
A That's correct.
Q And do you carry a professional license?
A I am licensed to practice law in the state of Texas, in the Western District of Texas, and the Fifth Circuit.
Q And, if you would, just run through your employment history briefly.

A Let's see, after law school I was in private practice for a year, then went to work for the El Paso County Attorney's Office, went to work after that for the El Paso County Judge, was an Assistant City Attorney out in El Paso for a while, the total was about 12 years. Then I -- that's when I went back to graduate school and got my Masters and after that I went --

THE COURT: When was that?

THE WITNESS: I graduated in 1989.

THE COURT: Just wanted to know if you knew my friend, Royal Ferguson?

THE WITNESS: Absolutely, yeah.

BY MR. WILLIS:

Q Yes, sir, and that's when you went into what position after your Masters?

A I went to work for the Texas Water Development Board. I was the program director for the economically distressed areas program. I supervised attorneys, engineers, and financial people. We were doing water and wastewater planning, engineering studies, finance, and construction to bring water and wastewater facilities primarily to colonias along the Texas/Mexico border.

Q And next after that you went into private practice again?

A Private practice, but not as an attorney, I went to work for a small environmental law firm -- engineering firm. I was house counsel. I also did some client development. I did some

of the socioeconomics on some of the planning studies and I also did some of the engineering tech work for the studies as well.

Q And after that position I think approximately 1996 you started with the TCEQ?

A That's correct. I worked in the Water Policy Division at that time. We worked on policy issues for the Commission. We also did quite a bit of rule development, as well as monitoring legislation and analyzing bills, sometimes participating in the drafting of those bills, that sort of thing.

Q From that position going forward, have you remained at the Texas Commission on Environmental Quality?

A Yes, under various names, but yes, it's always been the TNRCC or the Texas Commission on Environmental Quality. After that Water Policy position, in about 1999, the end of 1999 I became the section manager for the Water Rights Permitting Section. That handles permitting for surface water rights in the state of Texas.

Q And any other positions that you've had with the TCEQ?

A After being section manager of the Water Rights Section I became -- from about 2007 to 2009 I was the division director for the Water Supply Division. In that position I was manager of not only the Water Rights Permitting Section, but also the Public Drinking Water Section and the Utilities and District Section. So I was essentially doing -- managing water supply

regulation in the state.

Q And I understand in that position you organized and facilitated the Environmental Flows Advisory Group, as well as the first Science Advisory Committee?

A For Senate Bill 3, that's correct.

Q Okay. And your position currently again, tell us what all it entails.

A Well, I assist the deputy for the Office of Water. The Office of Water has all the old divisions that I was responsible for plus it has the water quality aspects of the Texas Commission on Environmental Quality. By that I mean the TPBS discharge permitting, the water quality discharge permitting, the storm water permitting, and also the water quality planning. We set the water quality standards. We do total maximum daily loads when sections of rivers or lakes are not meeting the water quality standards. And I assist the deputy in really managing the office, doing other duties as assigned.

MR. WILLIS: All right, we're actually though with the exhibit, your Honor --

THE COURT: Thank you.

MR. WILLIS: -- unless you want to keep it up. It's up to you.

THE COURT: That's fine. No, no, that's fine, you can go on.

MR. WILLIS: Okay.

THE COURT: I'm sure you'll have other exhibits, fine.

MR. WILLIS: I don't have any others. I just didn't know if you wanted to turn the lights up or not. It doesn't matter to me.

THE COURT: Thank you.

MR. WILLIS: Perfect.

THE COURT: I need a cue. Thank you.

BY MR. WILLIS:

Q Mr. Chenoweth, you've had the pleasure of sitting through this trial so far so you've heard all the evidence to date. And, again, the Court has already heard from several current -- former TCEQ employees about different aspects, including water master. Because of that I'm going to try to focus your testimony particular on issues that I believe the Court has indicated she would like to hear some more on.

First of all, let's start with water right permitting. Is that something that you would have any knowledge of at TCEQ?

A Yes.

Q In fact, would you be considered probably one of the people at TCEQ that has extensive knowledge about the water right permitting?

A I would say that was true.

Q Well, let's talk about it a little bit.

THE COURT: Do you want to offer him as an expert in Texas water permitting, or is it necessary?

MR. WILLIS: He was never designated as an expert --

THE COURT: Okay.

MR. WILLIS: -- your Honor.

MR. BLACKBURN: My understanding is he's being offered as a fact witness.

THE COURT: Okay.

MR. WILLIS: That's correct.

THE COURT: So I'm not going to hear any opinions from him?

MR. WILLIS: No.

THE COURT: Okay.

MR. WILLIS: Unless you'd like to hear some of his opinions.

(Laughter)

THE COURT: I like to hear everybody's opinions, but more or less if he's a fact witness

MR. WILLIS: Yes.

THE COURT: -- let's go on with that.

MR. WILLIS: Now that we're clear on that, as a matter of fact, there was at one point there was a request for a corporate representative to be designated for TCEQ on a variety of topics and it was made clear he was going to be a

representative for TCEQ on those topics. He was not called, there was never a witness called by TAP in their case, so he is now being brought to the stand as a fact witness.

THE COURT: Thank you.

MR. WILLIS: Thank you.

BY MR. WILLIS:

Q Mr. Chenoweth, let's talk about the permitting process in general. If someone wants to try to get a water permit in the state of Texas, let's talk about the process, where does it start?

A Okay. They file an application with the Commission with the Water Rights Permitting Division and that section takes the application in. There is first an administrative review to see that all the questions are answered and there is at least enough information for us to begin our technical review. At the conclusion of that analysis it's declared technically complete and then we shift into the technical review.

In the technical review we're looking to see that the water is going to be beneficially used, that the applicant is going to avoid waste, and then we do a environmental review to see what water we need to leave in the stream to maintain a sound ecological environment for the river --

THE COURT: Okay, that's -- the third one's a technical review and then the fourth one is environmental?

THE WITNESS: As part of the technical review.

THE COURT: That's part of, okay.

THE WITNESS: -- we do the environmental review.

BY MR. WILLIS:

Q And I hate to interrupt your thought process, but let's explain to the Court, if you would, when you say we do this, there's actually different teams in the Water Permitting Department, correct?

A True.

THE COURT: I'm sorry --

MR. WILLIS: Sorry, your Honor.

THE COURT: -- he said --

THE WITNESS: Yes.

THE COURT: -- true?

MR. WILLIS: Yes.

BY MR. WILLIS:

Q And if you would, tell the Court, in the Permitting Division, what different teams would be involved in the permitting process.

A Okay. There is the permitting team itself that handles the administrative review and coordination of all the paperwork and the drafting of the permits. But then there is a hydrology review, a hydrology team that will do the hydrology review with the water availability model. We'll discuss that a little bit later, I suspect. And then there is a resource protection team. The resource protection team really has two groups in

it. One is a group of water conservation specialists. They do that review to ensure that the water will be put to a beneficial use and will avoid waste. And then there is a environmental team that does the environmental review as part of the permitting process.

Q And that team includes -- I'm sorry, it includes environmental scientists as well?

A Environmental scientists, most of them are aquatic scientists.

Q Now, I think I interrupted when you were walking us through the permit process and then I think you were to the --

THE COURT: Technical review.

BY MR. WILLIS:

Q -- the technical review.

THE COURT: And he's just giving what I understand, I'll make sure this is right, the subparts of what constitutes the technical review.

THE WITNESS: That's correct.

THE COURT: Okay.

THE WITNESS: Okay, so the conservation team does their review for beneficial use and to avoid waste. That includes reviewing a water conservation plan for the applicant. And then the environmental protection team does their review.

BY MR. WILLIS:

Q I'm going to interrupt for a second, because before we get

to the environmental protection team, on this conservation team you said one of the things that they look at is that they review the water conservation plan of the applicant. Is that a requirement?

A Absolutely. For municipal and industrial applicants, those that are applying for those type of water rights, any water -- any application for over a thousand acre-feet requires a water conservation plan. For the --

THE COURT: I'm sorry, say that again? For industrial…?

THE WITNESS: And municipal water right applications any application for over a thousand acre-feet requires a water conservation plan.

BY MR. WILLIS:

Q So any municipality trying to go through the application process to obtain water and it was over a thousand acre-feet is what their request was but they did not have a water conservation plan, they would not be granted a permit?

A That's correct.

Q Okay. And --

THE COURT: Now, wait a minute. Do you need a water conservation plan for any other application?

THE WITNESS: For a agricultural water right you also need a water conservation plan. The threshold there is if you are applying for more than 10,000 acre-feet you need a water

conservation plan. We actually require water conservation plans for all types of water rights, but it's the consumptive rights that it really becomes more of an issue on.

THE COURT: And also help me out on -- when you're talking a thousand acre-feet, is that a month or a year, what does that mean?

THE WITNESS: A year. We're --

THE COURT: A year.

THE WITNESS: We're -- I'm sorry for the shorthand. We lapse into jargon. Water rights are issues for acre-feet in a year --

THE COURT: Thank you.

THE WITNESS: -- so it's acre-feet per year.

BY MR. WILLIS:

Q Now, under the resource protection team I think is -- or the technical review you were talking about, and you talked about the conservation aspect of it and you were about to get into the environmental protection aspect of the permit, I believe. Sorry for interrupting.

THE COURT: Is that different, the environmental science review is different from the conservation team?

THE WITNESS: Organization-wise they're part of the same team, but it's really two separate groups within that team.

THE COURT: Okay.

BY MR. WILLIS:

Q Before we go forward, is that because the Texas law -- water law essentially since the beginning of time required not just the beneficial use of the water, but to make sure water is not wasted?

A Yes, that's correct.

Q All right. And that's separate and apart from the environmental protection aspect of the permit?

A That's correct.

Q Okay, go forward with that.

A Since 1985 we have had the authority to, and the duty actually, to consider, make environmental considerations when we issue water right -- when we issue water right permits. And so that would be -- the Legislature has told us to look at instream uses, which is really broadly defined, we're trying to leave enough water in the river for the fish and wildlife that use the river. But instream use is also the recreational uses, if it's -- if there's kayaking we try to make sure that there's enough water left there for the kayakers or whatever. And then that also includes the duty for applications where the water will be diverted or stored within 200 river miles of the coast we have the requirement to consider the affects of the application on freshwater inflows to bays and estuaries and include in the permit, to the extent practicable, when considering other public interests special conditions to

protect that environment.
Q And the first time TCEQ had that statutory authority was in 1985?
A That's correct.
Q Proceed with the process from the environmental protection team going forward.
A You know, if I may ask my own question?
Q Sure.
A I do want to explain that our statutory authority regarding bays and estuaries, as I said, to my notion it is a balancing between environmental interests and other human use and public interests. That's where that --

MR. BLACKBURN: Your Honor, I'm not sure how we're going to do this, but it's clearly opinion I think being expressed and, you know, I mean --

MR. WILLIS: I could ask the question from the standpoint of policy of TCEQ rather than just opinion.

THE WITNESS: And I could answer from the standpoint of this is how we do things.

THE COURT: How's that?

MR. BLACKBURN: Better. Thank you, your Honor.

THE COURT: Thank you.

BY MR. WILLIS:

Q Mr. Chenoweth, let's talk about that. In the resource protection team when the environmental scientists are

considering permits what is the policy on the review of material to try to make a determination, what all do they look at from that standpoint when looking at a permit or a potential permit?

A We look at the best science that we can find, so it's reports from other agencies, science --

THE COURT: Texas Parks and Wildlife?

THE WITNESS: We certainly consider their information. As a matter of fact, the statute requires us to consider that sort of information. But we also --

BY MR. WILLIS:

Q When you're saying that sort of information, you're not saying specifically that information, but that sort of information?

A Well, I'm not sure that I had a specific example of something from Parks and Wildlife, but --

THE COURT: I think there was something earlier we saw from Texas Parks and Wildlife about bays and estuaries. There was an exhibit, wasn't there?

THE WITNESS: There is a -- most appropriately for the Galveston -- the Guadalupe-San Antonio Rivers there is a freshwater inflow study that was published by Parks and Wildlife in 1998. That certainly is considered, along with other --

THE COURT: So you've considered that every time

you've issued a permit on one of those two rivers?

THE WITNESS: Within 200 river miles from the coast. Our authority to consider the freshwater inflows to bays and estuaries is limited to, those permits, within 200 river miles --

THE COURT: Why?

THE WITNESS: -- of the coast.

BY MR. WILLIS:

Q By statute?

A By statute.

MR. WILLIS: As to why by statute, that's a different -- but it is in the statute.

THE COURT: How long is the -- well, goodness, the Guadalupe River is much longer than that.

THE WITNESS: The Guadalupe River, it depends on how you measure and who is measuring, but --

THE COURT: If you just drive to Kerrville it's a hundred and -- it's longer than that, isn't it --

THE WITNESS: Well, if you --

THE COURT: -- 200 miles?

THE WITNESS: -- if you consider some of the meanderings, it's about 450 miles.

THE COURT: That's what I was thinking. I'm just thinking, but I don't know how you do it, as the crow flies, I mean I was thinking of just driving.

THE WITNESS: Well --

THE COURT: To Kerrville it's about 300 -- I'm about 220 miles?

THE WITNESS: We're trying to figure the river miles --

THE COURT: That's not even where the headwaters are.

THE WITNESS: We try to figure river miles.

THE COURT: Okay.

THE WITNESS: So that takes all the meanderings in account.

THE COURT: That doesn't make sense, does it?

MR. WILLIS: Your Honor, my point of that is that the Texas Commission on Environmental Quality, including the Water Permitting Section, follows the authority that's been given to them by the Legislature.

THE COURT: So you can't consider the impact of -- you can't consider the impact of the bays and estuaries on any permit more than 200 miles away, river miles away from the bays and estuaries?

THE WITNESS: We're constrained by the statute in that respect.

THE COURT: Is that a no, you don't ever consider?

THE WITNESS: No, we don't consider.

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BY MR. WILLIS:

Q But to follow up on that, there are many other considerations on new permitting even if its above the 200 miles, it's just not -- the statute that specifically requires inflows for bays and estuaries does not apply to permits above the 200 mile radius?

A That's right. We're considering instream uses, leaving flows in the river for instream uses for permits above the 200 river miles, also between the coast and the 200 river miles, you've got to do both, you've got to consider what the riverine environment needs and what the bays and estuaries need.

Q And to make sure we're clear, above the 200 miles the TCEQ and the resource protection team considers the protection of the flows in that river, just not for the particular purpose above that 200 miles for the bays and estuaries, because that's not what the statute allows?

A That's correct.

MR. WILLIS: Does that make sense?

THE COURT: I'm afraid so. It doesn't sound so good, does it?

BY MR. WILLIS:

Q It is the statutory authority that TCEQ operates under, correct?

A Yes. And if I might add --

Q Please.
A -- up at the headwaters you don't --
THE COURT: Does it say you cannot consider or that you must consider?
THE WITNESS: It says you -- it says we must consider within 200 river miles --
THE COURT: So it doesn't say you can't consider.
THE WITNESS: I would have to go back and --
THE COURT: Maybe that's kind of key.
THE WITNESS: I'm sure that can appear in a brief.
MR. WILLIS: We've got to supplemental briefing on the issue is a good point because --
THE COURT: What's the statute?
THE WITNESS: That's 11.147 of the Water Code.
THE COURT: 11.147?
THE WITNESS: That's correct.
THE COURT: Thank you.
MR. WILLIS: And, your Honor, we will have a witness, Ms. Hoffman, towards the end of Defendants' case-in-chief that will address some of that issue.
THE COURT: Go ahead.
BY MR. WILLIS:
Q Mr. Chenoweth, continuing on the permitting process, besides the considerations that you've already discussed, one of the things you said earlier actually that we wanted to get

into a little bit more was water availability. Is that part of the element of the permitting process?

A Absolutely. Unlike some other western states, there is a requirement in the Texas statutes that before the Commission can issue a new water right it has to find that there is unappropriated water available at the source of supply. So in order to do that, that's what the hydrology team does. We use the water availability model to make those determinations. And also there is a requirement that any new permit cannot injure existing water rights, so the no injury analysis is also part of our hydrology review.

Q The water availability model, I'd like you to talk about that a little bit. Tell us what it is and describe some of the terminology that's considered.

A Well, we are directed in our availability analysis to take the water that would be there without any diversions and then subtract out all permitted amounts of water and --

THE COURT: Whether they are used or not?

THE WITNESS: Whether they're used or not.

THE COURT: Okay.

THE WITNESS: Full authorization. And then the amount of water that's left over is the amount of water that's available.

Now, hydrology tells us that the amount of water available depends upon your location in the stream. Closer to

the coast there would be more water available generally. Farther up near the headwaters there would be less water available. The hydrology also tells us that the amount of water that is available varies over time. This is -- you can just imagine sitting beside the Guadalupe River for several years and sometimes it's going to be at the same location there's going to be a drought and very little flow and at other times there is going to be a lot of flow. So the first --

BY MR. WILLIS:

Q I'm sorry to interrupt, but the first part of that might have been what you were getting back to. So the Court can understand, applications for permits, again you said they must consider water availability. The TCEQ uses, among other things, the water availability model, which we'll talk about more. But it is -- availability for each and every permit is considered extremely site -- both site and use specific, correct?

A That's correct.

Q And that's based on essentially the theories and the principles of hydrology?

A Site specific, yes. I'll get into the application specific in a little bit.

Q Okay, go ahead, I need a record.

A Okay. So the water availability analysis model starts with the data from the U.S. Geological Survey gauges over a

period of time. In the case of the Guadalupe-San Antonio I believe the period of record, as we call it, is from 1934 to 1989. We take that string of information for various locations up and down the basin and we subtract out the diversions that we know about, we add back in return flows from those diversions, if there were any return flows, and what we're left with is a time series of data for that period of record that is as close as we can come with our information to what water would be in the stream without any effects from man. I am going to --

Q Well, I don't know if I interrupted earlier, but I think you used the term in consideration of this "naturalized flow."

A Yes.

Q Okay. Would -- explain, if you would, to the Court naturalized flow.

THE COURT: Okay, by the way, that statute says "shall assess".

> "In consideration of an application for a permit to take, store, or divert water, the Commission shall assess the effects, if any, of the issuance of the permit on the bays and estuaries of Texas. For example -- for permits issued within an area that is 200 river miles of the coast, to commence from the mouth of the river, dah, dah, dah, shall include in any permit conditions necessary."

It doesn't say you can't --

MR. WILLIS: Right, there's nothing forbidding them from considering it --

THE COURT: Okay.

MR. WILLIS: -- in areas before -- before the 200 miles.

THE COURT: I just wanted to make sure.

MR. WILLIS: Right.

BY MR. WILLIS:

Q I'm sorry, if you would, what -- tell the Court what you mean by naturalized flows in the water availability matter.

A Okay. That is the flow that would have been in the stream but for the diversions and return flows from man's activities.

Q All right -- I'm sorry, go ahead.

A Well --

Q In fact let me ask you this. It seemed like in the testimony, and I think it was Mr. Trungale, I'm not certain, that discussed naturalized flows and water availability, what period of time -- and I think someone mentioned then they thought it was 21 years for a determination of naturalized flows, that's not your understanding?

A It depends on the basin. It depends on what records were available when we were developing the water availability models. In the Guadalupe-San Antonio it's 1934 to 1989.

THE COURT: Well, what about the subsequent years?

THE WITNESS: Okay, we have not developed naturalized flows for the subsequent years. What we are trying to do with the naturalized flows is not really see what would have happened in 2008, what we're trying to do is get a series of flows that is over a sufficiently long period of time so that we have a capture of the natural variation in the flow in the stream. So we have the droughts, we have the floods, and we have them in the --

THE COURT: Don't do that with the microphone. I'm sorry.

THE WITNESS: Oh, I apologize.

THE COURT: That's all right, Ms. Gano.

THE WITNESS: Sorry.

BY MR. WILLIS:

Q But the time period that you spoke of includes the drought of record through that period?

A That's correct.

THE COURT: But any drought of record prior to '89?

MR. WILLIS: Yes.

THE WITNESS: Well, the drought of record is the term we use to denote the worst drought when you consider both the duration and the severity of the drought, and that would be the drought of the 50s.

THE COURT: Just then it seems that there's nothing built into the data for climate change possibilities that may

have happened in the last 20 years.

THE WITNESS: The model does assume that what will happen in the future is exactly --

THE COURT: The same?

THE WITNESS: -- the same as what happened in the past. There's no trending one way or the other.

THE COURT: Is that scientifically valid?

THE WITNESS: What we're -- all models are an abstraction of reality. We get as close as we can. We're as close as we can with the science and the funding that we have available.

BY MR. WILLIS:

Q The one thing I think is extremely --

THE COURT: That's a good political answer.

(Laughter)

Q The one thing I think is extremely important to understand, again I think it was Mr. Trungale in expressing water availability, it was my impression that he was insinuating that the water availability model did not consider water that has been used by DNL use. Is that correct from your understanding?

A If I might suggest a slightly different order?

Q Please.

A I think it might be clearer to the Court if we talk about permitting under the naturalized flows and then get back to a

consideration of DNL users.

Q I turn it over to you to further -- please answer the questions on permitting then, if you would.

A Okay.

THE COURT: On what?

MR. WILLIS: On permitting. Actually he --

THE COURT: You interrupted him.

MR. WILLIS: Yeah, I did. And I think he's doing --

THE COURT: We both have.

MR. WILLIS: -- a good job of working us through step by step.

THE COURT: It is interesting.

MR. WILLIS: I thought you might enjoy this portion.

THE WITNESS: All right. So the --

THE COURT: So we're in hydrology and that's how we got off on the --

MR. WILLIS: Yes.

THE WITNESS: Right. Right. So we've got our own naturalized flow data set --

THE COURT: Say that again?

THE WITNESS: Our naturalized flow data set.

THE COURT: From the hydrology.

THE WITNESS: From the hydrology.

THE COURT: Okay.

THE WITNESS: And so the model takes --

THE COURT: Okay, I'm going to write this again. Hydrology study results in, what did you call it again?

THE WITNESS: Naturalized flow.

THE COURT: And that's based on historic data?

THE WITNESS: That's correct, the USGS gauge data for historical flow diversions and return flows that we have, yeah.

THE COURT: Thank you.

THE WITNESS: So then we take that naturalized flows starting at the top of the river at the first month of the first year in the record and we subtract out all the permitted amounts as if they were being fully utilized, because that's what we've been told to do.

THE COURT: By whom?

THE WITNESS: The Texas Supreme Court.

THE COURT: They did?

THE WITNESS: Yes.

THE COURT: Then you got to follow them.

THE WITNESS: That's a fact, not a legal opinion.

(Laughter)

And so we subtract out all the permitted amounts, we get the left over amount for that month, and then the model goes up and down the river through the time series and produces the amount of unpermitted water really for every month of that whole period of record. And then we put in the -- if there's any water available, we put in the proposed permit and see if

that permit can get its water. Okay --

THE COURT: I got it.

THE WITNESS: -- so if there's available water.

THE COURT: I think I may have found a little flaw in this.

MR. WILLIS: Please.

THE COURT: No, I meant based on historical data instead of what's going on now.

MR. WILLIS: Well, actually it was my understanding that the use of the historical data over a 50-year time period, including the drought of record, is actually a fairly conservative tool or portion of the water availability model. Again, with the understanding --

THE COURT: I don't know anything about it. I'm just saying if they don't factor in -- this is what he's saying, is that that model plans on the future being the same as the past --

MR. WILLIS: Right, and the model --

THE COURT: -- and if I'm to believe all the scientists that have testified the future is not going to be the same as the past, the past 20 years is not the same as the previous 50 years. Things are moving in a bad direction for freshwater inflows and maybe water available for the state period.

MR. WILLIS: I understand.

THE COURT: That's my concern.

MR. WILLIS: Okay.

BY MR. WILLIS:

Q And I don't think that's something that's within your area to be able to address, correct?

MR. WILLIS: I think we will have some water availability experts --

THE COURT: That would be great.

MR. WILLIS: -- later in the trial that can address that.

THE COURT: That would be great.

THE WITNESS: Okay.

MR. WILLIS: Again, I wanted you to understand from the --

THE COURT: The permitting process.

MR. WILLIS: -- permitting aspect --

THE COURT: And here I am cross-examining you on expertise after saying no.

THE WITNESS: I'll answer all your questions to the best of my ability.

Let me explain a couple of things here about unpermitted water available for an application.

THE COURT: Well, how do you reach that?

THE WITNESS: Okay.

THE COURT: Is it a percentage or --

THE WITNESS: Well, we -- well, we look at the type of application. In most cases, for example, if the application is for a municipal water right we want all of the water to be there all of the time. Otherwise, you know, the city would get their water right for water that would only be there 75 percent of the time and then what's the poor city to do when -- that 25 percent of the time when there's no water? So the type of application has different reliability criteria that we've developed over time. Historically, municipal had to have a hundred percent of the water a hundred percent of the time, agricultural or irrigation water had to have 75 percent of the water 75 percent of the time, and at various times we use different criteria for different things, different other types of applications.

We are seeing that -- two trends. One is that it's very unusual for a -- currently for many municipal applications to have full 100 percent availability all the time, but the city can fill in the gaps with alternative water supplies, so --

THE COURT: Such as --

THE WITNESS: Well --

THE COURT: -- private pipelines or --

THE WITNESS: Or groundwater. So their strategy is we'll use surface water when we have it, in times that we don't have it we'll use groundwater, for example.

THE COURT: So in like a sewer system, is that right -- does that go without a treatment or is it reused, or how does all this work?

THE WITNESS: Okay.

THE COURT: I mean presumably water never disappears. It evaporates and comes back, right?

THE WITNESS: That's right.

THE COURT: So where does it all go?

THE WITNESS: Okay.

THE COURT: That's a ridiculous question, but just water municipalities, how about that?

THE WITNESS: All right, let me explain that in terms of, oh, I want to say 20 years ago, a typical situation 20 years ago where the city is on surface water. They would get their authorization from the TCEQ. They would -- that would probably mean a reservoir to increase the reliability up to a hundred percent -- water a hundred percent of the time. They'd have their authorization. They'd draw their water out. They'd treat it to drinking water standards, send it through their pipelines, everybody would use it in their homes, water their lawns. Water that was flushed went into the sewer system, went -- got treated to water quality standards and generally got discharged into the river.

THE COURT: And it's treated -- it's treated?

THE WITNESS: It's -- yes, since --

THE COURT: But not to drinking water standards?

THE WITNESS: Not to drinking water standards, the --

THE COURT: So it goes back into our freshwater source as not completely treated sewage?

THE WITNESS: Well, I would --

THE COURT: Where does it go?

THE WITNESS: It goes back into the river.

THE COURT: Okay.

THE WITNESS: I would not characterize it as not completed treated sewage. I would characterize it as --

THE COURT: No, it's okay.

THE WITNESS: -- treated to --

THE COURT: Because the river water's not clean either.

THE WITNESS: Exactly.

THE COURT: Without any --

THE WITNESS: Exactly.

THE COURT: -- without any sewer water.

THE WITNESS: On a lot of rivers if we put up a glass here of the treated effluent and some raw water out of the river, one would be murky but the effluent would be clear.

THE COURT: Okay.

THE WITNESS: For example.

THE COURT: So we know that's not a problem.

THE WITNESS: Well, it's a problem that we regulate

and monitor through the --

THE COURT: Testing?

THE WITNESS: Testing and through the Clean Water Act and then -- and drinking water through the Safe Drinking Water Act.

THE COURT: One of those other pesky federal laws.

MR. WILLIS: In a complete separate division within the agency on the water quality.

THE WITNESS: A separate division, same office as the Office of Water.

So just to complete the circle and be clear --

THE COURT: I'm sorry, I keep interrupting.

THE WITNESS: No, I'm just trying to be responsive to what I think your issue is.

Most water right permits where we're drawing the water out of the stream do not have a special condition in them that says you must return "X" amount of water or "X" percentage to the stream. There are some that do, so it's not a hundred percent, but --

THE COURT: But most don't.

THE WITNESS: The vast majority don't. Which means that the city can utilize that water, reuse it up to full consumption and they wouldn't be violating their water right. In fact, that's why I use 20 years ago. In the recent past, as the regulations have gotten more and more expensive or you had

to treat to a higher water quality standard when you discharge it back into the stream and with water becoming less and less available, cities have started to do two things. One is what we call direct reuse, where they treat it to a certain level under regulations by us and then they use it for irrigation. A lot of golf courses are irrigated these days with this direct reuse water.

We also have the concept in Texas that we label indirect reuse where a city or other water right holder or even a city or entity that had utilized groundwater and was discharging the treated effluent, they let it stay in the bed and banks, go down a distance, sometimes it's a short distance, sometimes they let it go down to a reservoir downstream, they pick it back up again and reuse it. That requires a separate type of authorization from the TCEQ. It's a bed and banks permit, but it is -- and it's what we generally refer to as indirect reuse.

THE COURT: With the -- I mean if it goes so far down the river it's out of the municipality so --

THE WITNESS: Well, for example Tarrant Regional Water District that supplies much of the water to Fort Worth and other cities, it goes halfway to Houston nearly, well maybe a third of the way to Houston, down to two reservoirs they have down there. They pump it all the way back up to Fort Worth to reuse again because --

THE COURT: Is it aerated on the way, is that part of the treatment, is that what's happening?

THE WITNESS: Well, there is some notion that there is some treatment in the river and in the reservoir, but it's really driven by the fact that we have very, very limited water these days and, you know, that is a dependable source of water. And if that's the cheapest alternative, is to pump it that far, then that's what a lot of cities do. When it gets back up there they run it through their drinking water plant again to make sure it's up to drinking water quality standards. It's been blended with the river water.

BY MR. WILLIS:

Q Mr. Chenoweth, back on the -- to try to get back to the permitting process itself --

THE COURT: I'm sorry, this is just so interesting.

MR. WILLIS: I thought it might be.

BY MR. WILLIS:

Q I want to make sure that the Court understands also if an applicant goes through this process to try to get a permit, after everything that's been done, this is not basically the TCEQ deciding yes, they get the permit or no, there's quite often many restrictions in the permits, correct?

A That's true. These --

Q Explain some of those restrictions.

A Well, one thing, we could decide that they are not going

to beneficially use all the water or that all that water is not available and we -- they may have applied for "X" amount and we give them "X" minus "Y" amount. And then there are special conditions. Most of the special conditions that we impose these days are environmental flow restrictions. Up to this point in time typically there would be a minimum flow in the -- that must be maintained in the river. Let's just use a nice round number for example. If this particular segment of the river we decided needed a hundred cfs, they couldn't divert -- they couldn't store or divert, depending upon their application, unless the flow was at least a hundred cfs and they couldn't divert below -- to cause the river to drop below a hundred cfs.

Q Is this a good time in the permitting description to talk back about how naturalized flows does in fact consider DNL use?

A An excellent time.

Q Please.

THE COURT: Are you saying that it does not?

MR. WILLIS: It does. And I think --

THE COURT: It does, okay.

MR. WILLIS: -- the implication at this point to the Court has been that the WAM model and the use of the naturalized flows as a basis for it does not consider water taken out by DNL users.

//

BY MR. WILLIS:

Q Mr. Chenoweth, would you address that, please?

A Sure. In the naturalized flow process, as I explained, we started with the actual flow in the river from the gauged United States Geological Survey gauges and we subtracted out known diversions and added back in known return flows. Since we don't know how many DNL users there are or how much water they're using we are not able to subtract out -- or, excuse me, add that back in to make our naturalized flows a true naturalized flow where it absolutely represents what would be in the river without the effects of man. So --

Q And that's a specific amount?

A That's an amount for the -- for all the DNL users that there are. We aren't able to subtract that out because we don't have that information. But now --

THE COURT: You can think about it.

MR. WILLIS: Right, but --

THE WITNESS: Okay.

BY MR. WILLIS:

Q My point is is it considered?

A Well --

Q Is it taken into account?

A Well, let me explain how it's taken into account.

Q Thank you.

A If we had that information and we subtract -- and we added

that back in so that our naturalized flow was a little bit higher reflecting the water used by domestic and livestock users, what we would then do when we go through the permitting process is we would subtract out that water because DNL users are superior to all the permitted water right holders.

THE COURT: So I understand you can't get the information so you can't use the information, so the end right it is what it is with or without the DNL?

MR. WILLIS: Well --

THE WITNESS: It is what it is, but if we had that information all I'm saying is we would add it back in then we would subtract --

THE COURT: And subtract it back out.

THE WITNESS: -- we would subtract --

THE COURT: That's what I'm saying, it doesn't -- it's a nonentity --

THE WITNESS: That's right.

THE COURT: -- because --

MR. WILLIS: To make sure --

THE COURT: I don't mean to say it's a nonentity that we shouldn't be looking at, you know, in some overall plan, if there is one, but I'm not sure that it's financially feasible ever to do that.

MR. WILLIS: I think the point that we are trying to get across, your Honor, is that the naturalized flow process

is --

THE COURT: Takes that into consideration.

MR. WILLIS: It's the historical flow of the river and that includes the water with the DNL already out.

THE COURT: I got it.

MR. WILLIS: Okay.

THE COURT: I mean it has to be. The end result, when it gets to the bays and estuaries the DNL is out, like every other permit.

MR. WILLIS: Exactly. Thank you.

THE COURT: Right?

THE WITNESS: Right.

MR. WILLIS: If I can I'll go on --

THE COURT: No, go ahead.

MR. WILLIS: -- unless you have something else on that, your Honor?

THE COURT: I'm just slow to boot up on this.

BY MR. WILLIS:

Q You talked about restrictions in app -- I'm sorry, restrictions in permits in the permitting process. Now, these are for permits for water diversion or for amended permits at any point after the Water Adjudication Act of 1967, correct, the process that you've just described?

A That's correct.

Q So certificates of adjudication that I think have been

explained, so we won't go back through that process, is a result of that Act in --

THE COURT: I'd prefer not to know anything more about them.

MR. WILLIS: I'm sorry?

THE COURT: I'd prefer not to know anything about them.

MR. WILLIS: Thank you. Well, there's one thing I think that --

THE COURT: They're treated the same?

MR. WILLIS: They're treated the same.

THE COURT: Under your withdrawal.

BY MR. WILLIS:

Q But there's one thing that I think the Court needs to understand, is that although permits, not certificates of adjudication, but permits have these specific limitations in the permits, the certificates of adjudication also have limits?

A Well, the certificate of adjudication is limited in the way that any water right is limited, it has a specific amount in acre-feet per year, so the water right -- the certificate holder cannot take any more water in a given year than what is in the certificated amount. Some of the certificates of adjudication and permits, most typically for irrigation or agricultural use, also have a restriction on how fast the diversion out of the river can occur. Sometimes those are also

in municipal or industrial, it's hard to ever say something's 100 hundred percent in water rights.

Q But that's consistent --

THE COURT: I hate to interrupt you, but that -- does that mean -- because someone else told me from the TCEQ that if the certificate of adjudication or the permit allows up to 1,000 acre-feet a year then when they start withdrawing that they still have to notify the TCEQ. Is that both for the certificate of adjudication and the permit?

THE WITNESS: That's true in water master --

THE COURT: So that controls the flow no matter what, right?

THE WITNESS: That's true in water master areas, which is certainly the Guadalupe and San Antonio.

THE COURT: Are there non-water master areas that have certificates of adjudication?

THE WITNESS: Certificates of adjudication and permits, they have the same restrictions, they just don't have to go through that process of notifying the water master or the TCEQ --

THE COURT: What bodies of water would that apply to? Not our two rivers that we're here today?

MR. WILLIS: No, they are under the --

THE WITNESS: That's right.

MR. WILLIS: -- South Texas Water Master.

THE COURT: But just out of curiosity what would those --

THE WITNESS: Sabine, Trinity, Colorado, Brazos, you know, most of the state actually.

THE COURT: Why is that? Why is that differentiation made?

THE WITNESS: Well, the -- there are several different ways in the statute that we can create water masters. We created -- the Rio Grande Water Master was created by Court Order, but the South Texas was created by the Commission and the Concho was created by the Commission. There sometimes -- as was explained, the water masters are paid out of fees by the water right holders and they get better enforcement, hopefully better maximized use of the resource. Sometimes the water right holders don't appreciate the benefits of a water master and we run into opposition. But in our sunset legislation this last session the Legislature directed the Commission to go through a five-year cycle and evaluate all the non-water master areas in the state and determine if it might be appropriate to start appointing water masters in the rest of the state.

THE COURT: Thank you.

BY MR. WILLIS:

Q Mr. Chenoweth, let's talk about the Senate Bill 3 process with you a minute.

THE COURT: I'm sorry, the what?

MR. WILLIS: The Senate Bill 3 process.

THE COURT: Thank you.

BY MR. WILLIS:

Q Do you have any knowledge or information to share with us on that?

A Yes.

Q Tell me about your involvement.

A Well, let's see, I was one of the people at the TCEQ that analyzed the bill and various versions of the bill, followed it through the legislative process. I was the resource witness on the House and the Senate Natural Resource Committees when Senate Bill 3 went through the legislative process and I worked on implementation for the bill.

Q I'm going to ask you to give a very brief description -- I'm sorry, a very brief description of the process and then we'll break it down and ask questions about each aspect of it, if you would.

Let's start, I guess, from the creation of the science teams and the stakeholder group.

A Okay. Let me start back up at the -- at the state level, because that's where the process started. The Environmental Flows Advisory Committee, excuse me, Group, was set up. That's got three members of the House, three members of the Senate, as well as a member from the Texas Commission on Environmental Quality, the Water Development Board, and Parks and Wildlife on

it. That group set up the basins, they set up -- and they are the group that appoints the bay and basin area stakeholder committees.

THE COURT: Who does that again?

THE WITNESS: That's the Environmental Flows Advisory Group.

THE COURT: And who are they?

THE WITNESS: Three members of the House, three members of the Senate, and a member each appointed by the Governor from the TCEQ, the Texas Water Development Board, and Parks and Wildlife.

THE COURT: So they appoint both the scientific and the -- just the stakeholders?

THE WITNESS: Well, the appoint -- I've gotten as far as the stakeholders.

THE COURT: Okay. Sorry.

THE WITNESS: Okay. For the bay and basin group, so it's not so --

THE COURT: Three from the Legislature?

THE WITNESS: Three from the House, three from the Senate.

THE COURT: Three from the House and three from the Senate. And then one each of the Governor's appointments?

THE WITNESS: Right.

THE COURT: Three?

THE WITNESS: From those three agencies.

THE COURT: From the TCEQ, Parks and Wildlife --

THE WITNESS: Wildlife, and the Texas Water Development Board.

THE COURT: Okay, thank you.

THE WITNESS: And that group appoints the bay and basin area stakeholder committees.

MR. WILLIS: Mr. Chenoweth, I'm sorry --

THE COURT: So that's nine people.

THE WITNESS: That's nine people.

MR. WILLIS: If you could speak -- drop your arm and speak a little more into the mike. I'm sorry; I know you're trying to --

THE COURT: I just want to hear from him.

MR. WILLIS: I know, but I couldn't hear.

THE COURT: Oh, I'm sorry. I guess it's just not the two of us; we need to let them hear too.

Okay, so nine people appoint the stakeholders for each basin?

THE WITNESS: Well, each basin group. So --

THE COURT: Okay, like San Antonio-Guadalupe would be one basin?

THE WITNESS: San Antonio-Guadalupe with a couple of the coastal basins together were one group. The Neches and Sabine were one group. The Trinity and San Jacinto were one

group. So that's why we talk about them in groups. That local stakeholder group also appoints -- then in turn appoints the local science team, the bay and basin expert science team.

THE COURT: Wait a minute, the stakeholders then do what?

THE WITNESS: Appoint the basin science team.

THE COURT: That seems a little odd, doesn't it?

MR. WILLIS: It gives all the local stakeholders an opportunity to express their invitation --

THE COURT: I got it.

MR. WILLIS: Okay.

THE COURT: I just thought it a little odd.

THE WITNESS: The --

THE COURT: It makes it look like the stakeholders are in charge of all of it.

THE WITNESS: Well --

MR. WILLIS: Well, I think he can address that issue.

THE WITNESS: There are some checks and balances in the process --

THE COURT: Okay.

THE WITNESS: -- and here's a big one. The big group, the Environmental Flows Advisory Group --

THE COURT: The nine.

THE WITNESS: Yeah. In addition to appointing the local stakeholders, they also appointed a statewide Science

Advisory Committee.

THE COURT: Okay, they also appoint, what's it called?

THE WITNESS: The Science Advisory Committee.

THE COURT: Okay.

THE WITNESS: Now, that's a statewide committee that tries to do a job of overall coordination and direction of all of the local science groups.

THE COURT: So this is a legislative scheme where the Legislature is in charge essentially of all the appointments.

THE WITNESS: In the sense that yes, they appointed the --

THE COURT: Plus the two -- three Governor appointments.

THE WITNESS: They appoint the stakeholders and they appointed the science team. Now that --

THE COURT: And what's the mechanism to remove a stakeholder or a science member? Has that ever been used?

THE WITNESS: Well, no one has -- there have been some resignations, but no one has -- there hasn't been --

THE COURT: No impeachments.

THE WITNESS: -- an impeachment process. There hasn't been a complaint that I have heard of that somebody needed to be removed.

THE COURT: No, I just --

THE WITNESS: Yeah, on --

THE COURT: -- it's not that big a deal, I was just curious.

THE WITNESS: Not a mechanism there. That statewide Science Advisory Committee is the committee that one of Plaintiff's experts, Dr. Montagna --

THE COURT: Right.

THE WITNESS: -- served on and I believe one of the --

THE COURT: I think a couple that we've heard from have been on it.

THE WITNESS: Well, you're -- I only think -- no --

THE COURT: One.

THE WITNESS: -- you've just heard one. I think you'll hear another one --

THE COURT: Okay.

THE WITNESS: -- from the Defendants' side shortly.

THE COURT: So what happened with the stakeholders in the basin here we're talking about?

THE WITNESS: Well, the first thing that happens is the science team comes up with their recommendations and they delivered their recommendations on March 1st of this year.

THE COURT: First the science team recommends?

THE WITNESS: First the science team.

MR. WILLIS: For purposes of clarification, and you

might have already been there, as you've said several times, I want to make sure that we're all on the same page, but he was first describing the process itself. I don't know -- if he doesn't need to be through with that, that's fine, but now he's answering a question directly regarding the process for this basin. Which is fine, I just want to make sure --

THE COURT: I thought we were talking about the SB3 bill.

MR. WILLIS: Yes.

THE COURT: We've moved from the permitting process to SB3.

MR. WILLIS: Right.

THE WITNESS: Right.

MR. WILLIS: But the SB3 is not --

THE COURT: And how it was --

MR. WILLIS: -- limited to this basin obviously.

THE COURT: No, I know that, but what I heard from another expert or witness or something, I've forgotten how he was classified, was that it was not working --

MR. WILLIS: Exactly, and that's --

THE COURT: -- for this basin because the stakeholders did not reach a consensus. So it led me to think can you remove the stakeholders or say we want you to come to an agreement or what's the enforcement mechanism to say you have to do that.

MR. WILLIS: Okay.

THE WITNESS: Well, let me describe for you --

THE COURT: Or maybe they came to an agreement and I didn't get the right information.

THE WITNESS: Let me describe for you a situation that happened in another basin --

THE COURT: Okay.

THE WITNESS: -- as a way of describing an enforcement mechanism.

In the Sabine-Neches Basin the science team came up with their recommendation and then gave that to the stakeholders and the stakeholders came up with what they said you can't say we didn't come up with recommendations because our recommendation is that you don't establish any environmental flow standards.

THE COURT: Well, that would work. So the stakeholders said no environmental --

THE WITNESS: Flow standards. We need to study it more before we can come up with standards. That recommendation, as in the same process in all of these, the BBEST report first goes to the statewide science team, that reviews it and comments on it --

THE COURT: This is called a BBEST -- it's called a BBEST?

THE WITNESS: The BBEST, yes.

The SAC makes their comments on it. The stakeholder committee in the Sabine-Neches came up with their recommendation of no environmental flow standards.

THE COURT: So the stakeholders get the science committee with the comments after the comments are made from the state group, state science committee?

THE WITNESS: Well, I believe they get the comments, the get the report, but they're under a very quick timeline to do their business so they certainly have access to the comments of the science committee. But their job under the statute --

THE COURT: Whose "they" now?

THE WITNESS: Oh, pardon me, your Honor, the stakeholders.

THE COURT: Okay.

THE WITNESS: Their job under the statute is to take the information from their science committee, the BBEST, and to balance that with human needs and other public interests -- I'm paraphrasing the statute, I don't think I've got the words exactly right -- but they do a balancing of those -- of all the interests of competing demands for water and make recommendations to the TCEQ for the final environmental flow standards.

THE COURT: So the final recommendation comes from the stakeholders?

THE WITNESS: Well, actually in once sense yes, it's

a final recommendation, but the TCEQ certainly has the option to, and it really considers both the stakeholders recommendations on the balance as well as the recommendations from the science team and the recommendations from the Science Advisory Committee, or the commentary on the BBEST report.

THE COURT: Well, that's --

THE WITNESS: Only it gets more complicated.

THE COURT: Go ahead. I'm ready. I've come this far.

THE WITNESS: At the TCEQ it goes through a rule making process, which on a high level our state administrative procedures ruling making process is very similar to the federal rule making process, a proposed draft rule is developed, printed in, in our case, the Texas Register. There's a public comment period and comments come in, we respond.

THE COURT: Public comments, okay.

THE WITNESS: And --

THE COURT: So that's where the rest of the public comes in, it's not on one of these teams.

THE WITNESS: That's right.

THE COURT: Are there hearings?

THE WITNESS: There can be a formal public hearing. Typically we do, but in truth of fact most of the comments come in as written comments rather than comments at a public hearing. But we have a public hearing.

THE COURT: If you have enough comments, is that -- I suppose you don't have a hearing?

THE WITNESS: Well, typically under the state procedure if there's significant amount of people asking for a public hearing we have a public hearing.

THE COURT: Okay.

THE WITNESS: But we typically just go ahead and schedule one so that we don't have to adjust the schedule depending --

THE COURT: Delay things.

THE WITNESS: Yes.

THE COURT: Just build it into the initial programming.

THE WITNESS: Exactly.

BY MR. WILLIS:

Q And then ultimately the TCEQ is tasked with basically a balancing act in the different recommendations from both the stakeholders and the science group?

A Well, I would characterize it as different than balancing the different recommendations. They're ultimately charged with balancing the needs of the environment, both the instream environment and flows needed for the bays and estuaries, with human needs and other public interest considerations and, you know, trying to make this thing work for everybody. And they then adopt environmental flow standards in a rule and then in

as new water right applications come in they really apply the rule rather -- and put those environmental flow standards, incorporate them into the permit, rather than go through the process that I described where the resource protection does a case-by-case evaluation.

And I should say as part of that old-style permitting process there was the ability for a contested case process, protests and arguments over what the appropriate environmental flow consideration should be in a permit. After Senate Bill 3 environmental flow standards are in place there still can be a contested case hearing, it could be over water conservation, it could be over water availability or other aspects of the statutory requirements for water rights, but the idea is the dispute over possible environmental flow considerations has been changed by the Senate Bill 3 process from a contested case process to a rule-based process where the rule was developed with lots of stakeholder input, lots of science input, in a very public open transparent process.

Q So if I understand and to summarize, the TCEQ since 1985 has been tasked with through the Legislature including these environmental standards for environmental flows for the bays and estuaries and permits, in considering them and approving them, and that process now has evolved in, rather than a permit-by-permit application process, under Senate Bill 3 to a similar but statewide process and also more open, including

both the science teams and the stakeholder groups as far as input?

A That's correct.

Q Mr. Chenoweth, frankly I know the Judge is obviously probably tired of hearing about it, but --

THE COURT: No, I'm just thinking about it.

MR. WILLIS: One of the things -- I'm sorry, go ahead.

THE COURT: I guess, you know, when you talk about balancing between the human and environmental needs I would hear from I'm sure if there were any environmentalists here they'd say you don't balance, there'll be no human needs unless you look at the environment first. So I guess that's one thing someone would tell me, right?

MR. WILLIS: I anticipate that if you had any of Mr. Blackburn's people, they will say that. However, I think if you were from the other side you'll hear some --

THE COURT: There's another side?

MR. WILLIS: There is.

THE COURT: Mr. Willis.

MR. WILLIS: And as soon as I get down from here I'm sure they're ready to get going.

THE COURT: You're doing great, good witness.

MR. WILLIS: Well, Judge -- I'm sorry.

THE WITNESS: Well --

BY MR. WILLIS:

Q Any points you want to make?

A I would like to describe a couple of the other changes in the process that Senate Bill 3 made besides going from a case-by-case contested process to the rule process.

Senate Bill 3, in Senate Bill 3 the Legislature recognized that the way that the TCEQ had been doing environmental flow special conditions was maybe not as sophisticated as it needed to be. In the past, as I've described, we would put environmental flow conditions in that were really kind of a minimum flow standard. If the river was below that level, no diversions, above that level you were able to divert. But the river actually fluctuates over time. You know, there's low flows and there's times of high flows. And there are environmental benefits for each -- for this fluctuation and the critters have really adapted to a fluctuating environment. So in Senate Bill 3 they directed that these standards would be a flow regime whereby it wouldn't just be a minimum standard, but there could be standards for different levels, different conditions in the river.

So the science teams and the stakeholder teams have taken that and there's no one cookie cutter way that they have decided is best for all the streams in Texas, but in general high level there is -- a lot of the flow recommendations come into a flow for base or drought times, dry times, average

times, and wet times that can be -- those are defined on a very basin specific standard. There's also these periodic rain events where you get periodic pulses of high flows, those have environmental benefits and so they have been giving us recommendations to design and to keep some level of pulses flowing throughout the system.

So that was an additional change from Senate Bill 3 and that's what the bay and basin groups have done so far.

There is also a provision for adaptive management. The Legislature realizes that science moves on, that things that we thought would work sometimes work, sometimes they don't work, so this is a continual process of setting standards in place, improving the science, maybe monitoring to see how things are developing and then coming back through a cycle and doing new standards.

Q Does that include re-opener?

A Well, re-opener was my final point, but this is a reevaluation --

THE COURT: What does that mean, re-opener?

THE WITNESS: Yes, the re-opener is the shorthand way of saying since the effective date of the Act, September 1 of 2007, any new water right permit that we issue has a provision that we are able to go into that water right in the future and adjust the environmental flow conditions. There is a limitation on that in that we can't move it up more than

12½ percent.

THE COURT: Take away?

THE WITNESS: Well, I guess it's a glass half full, glass half empty situation. If the -- in a simplified environmental flow restriction, if it was a hundred cfs we could go up to 112.5 cfs as the level of the river that had to be there before you could divert.

THE COURT: Okay, I've got it. Not that they get 12 percent more, but --

THE WITNESS: Right. Actually --

MR. WILLIS: The restriction itself.

THE COURT: Okay.

THE WITNESS: The restrictions can be 12½ percent greater.

THE COURT: And does that apply for everyone, for every new permit?

THE WITNESS: Every new permit issued after the effective date of the Act.

MR. WILLIS: Or any amendment to existing permits after the effective date of the Act that requires more water.

THE WITNESS: A new appropriation, more water.

MR. WILLIS: Exactly.

BY MR. WILLIS:

Q Mr. Chenoweth, if we could move on to the area of remedies. I know the Judge has expressed some interest in

that. Do you have any knowledge of SEPs, supplemental environmental projects?

A I have some knowledge of those.

Q Tell me have you been involved in any in any manner?

A I have not personally been involved in any of those.

Q What's your knowledge from your work at TCEQ regarding SEPs?

A Well, they -- as the executive director explained, they can be set up ahead of time whereby penalties and enforcement actions, the entity that is being enforced against can elect to have a portion of those penalties be sent to a SEP to fund a project and in lieu of the penalties being paid to the State of Texas. And so we've been able to, you know, do some really good projects with those types of supplemental environmental projects.

Q And so clearly the TCEQ has the authority in fact to use those SEPs for environmental projects?

A Yes, we have the authority from the Legislature to do that.

Q And the Texas Water Trust, what can you tell us about that?

A The Texas Water Trust was set up and is actually run by the --

THE COURT: Hold up for me just a second. I'm sorry. Okay, go ahead, Texas Water Trust?

THE WITNESS: Is set up by -- run by the Texas Water Development Board. The --

THE COURT: What is that? What do they do?

THE WITNESS: It's a state agency and they do water planning. You know, you might have heard of the regional water plans that are produced on a five-year cycle and they produce a state water plan. The idea of the plan is very simply to estimate how much water we're going to need in the future, how much existing water supplies we have, and come up with different options and strategies for overcoming a shortfall.

They also fund water projects through a variety of mechanisms. They get some EPA money that they are able to loan out on a revolving basis. And they also are able to issue their own bonds, borrow their own money from the bond market, and in turn loan that out to cities and political subdivisions to do water and wastewater projects.

THE COURT: What kind of projects do they do?

THE WITNESS: Well, they can do everything from funding water treatment plants or drinking water plants or lake water plants. They can also fund or partially fund construction of reservoirs. They also do other science-based studies to improve our understanding of how much water that we have.

THE COURT: Thank you.

//

BY MR. WILLIS:

Q You were describing the Texas Water Trust, I believe?

A That's right. The Water Trust was created by the Legislature. It is a way for a water right holder to put a water right into this trust, and they can either put it in for a term of years or on a perpetual basis, and the water that's in the Water Trust is protected from cancellation and it stays in the river for the benefit of the environment.

MR. WILLIS: Your Honor, at this time I'm going to pass the witness.

THE COURT: So they don't get it back out? Anybody can apply to the Texas Water Board or this?

THE WITNESS: They have another vehicle called the Water Bank. It is more for to kind of facilitate market transactions in water rights. But the water -- the idea of the Water Trust is that the water right will stay in there for the benefit of the environment.

THE COURT: Okay. So any leftover water, for instance that they don't use, they could put in the Water Trust?

THE WITNESS: They could put it in the Water Trust.

THE COURT: What percentage -- how much water is in the Water Trust?

THE WITNESS: Very, very little.

THE COURT: Okay.

THE WITNESS: I'm not sure that there is more than a couple of water rights in the Water Trust, if that.

THE COURT: Oh, dear. And what about the Water Bank?

THE WITNESS: I am not familiar enough with the --

THE COURT: Okay.

THE WITNESS: -- with the status of that.

THE COURT: Thank you.

MR. WILLIS: Your Honor, I've passed the witness. If at all possible, and this is on my request --

THE COURT: A break?

MR. WILLIS: -- I've been standing up for an hour and a half --

THE COURT: Fifteen minutes. I'm sorry.

MR. WILLIS: -- I'd really like to take a quick break.

THE COURT: Yes, sir. Thank you.

MR. WILLIS: Thank you.

THE COURT: And if you all really get too tired of doing it, and it's just we have the podium set up to do the overhead deal, you can do this from your table if you get fatigued. And you'll have to have somebody else do the exhibits though.

MR. WILLIS: We appreciate it. Judge Fischer would roll over in his grave if I was seated speaking in front of the Court.

THE COURT: I just don't like to exhaust people.

We'll take a break. Thank you, sir.

(A recess was taken from 3:10 p.m. to 3:45 p.m.; parties present)

THE COURT: You all ready?

Everybody's smiling, that's nice.

(Laughter)

It's because it's late Friday?

MR. BLACKBURN: Late Friday, that's a good sign.

THE COURT: I didn't realize we were on cross examination already.

MR. WILLIS: I passed the witness, your Honor.

THE COURT: Thank you.

MR. WILLIS: Thank you.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Okay, now Mr. Chenoweth, I have a series of questions for you and first of all new permits, I come in and I apply for a TCEQ permit to get a water right. Does that water right have to be for a beneficial use?

A Yes.

Q And if the beneficial use is not on the list can I get a permit for it?

A No.

Q Now --

THE COURT: What is the definition of beneficial? Is it statutory?

MR. BLACKBURN: I believe Section 11.023?

BY MR. BLACKBURN:

Q Do you know that off the top of your head, Mr. Chenoweth?

A No, I'd have to look at the -- I'd have to look at my Water Code. I'm sorry.

Q Well, I have a note that says 11.023, Purposes, (a), domestic and municipal, agricultural and industrial, mining, hydroelectric, navigation, recreation and pleasure, public parks, and game preserves. Does that sound about right?

A That -- there's two statutes, there's an order of preference statute and then there's one defining which -- what purposes that water rights can be issued for. I think maybe you were reading from the statute that gives the order of preferences, but I could be mistaken.

Q And then Section 11.002(4) defines beneficial use as the amount of water which is economically necessary for a purpose authorized by the chapter when reasonable intelligence and reasonable diligence are used in applying the water to that purpose and shall include conserved water. Does that sound right?

A That sounds like the definition of beneficial use.

Q Now, bay and estuarine inflows, was that ever a beneficial use?

THE COURT: Sorry, wait a minute.

(Pause)

Say the question again, please.

BY MR. BLACKBURN:

Q Bay and estuarine inflows, was that ever on the list of beneficial uses?

A Not by statute, no, I don't believe so.

Q How about by rule of the TCEQ?

A It might have been by rule at some time at some point.

Q And is that -- wasn't that the basis of the San Marcos River Foundation application? There was a definition under beneficial use that included inflows, correct?

A The San Marcos River Foundation, yes, did have an application in for -- to us for instream uses -- and they did base it on a rule by the TCEQ.

Q And --

THE COURT: What was the rule?

THE WITNESS: I believe it was the one that Mr. Blackburn was referring to.

THE COURT: Beneficial use, or what?

THE WITNESS: A definition of beneficial use.

BY MR. BLACKBURN:

Q However, that was removed, was it not?

A I believe so, yes.

THE COURT: I'm sorry, say that again?

MR. BLACKBURN: The answer or the question? I asked was the --

THE COURT: What was removed?

THE WITNESS: The definition of beneficial use in TCEQ regulations was changed.

THE COURT: When?

THE WITNESS: I'm sorry, I'd have to go back and research that.

THE COURT: After the application?

THE WITNESS: Yes, after the application and after the application was denied by the Commission.

THE COURT: So this was an in-house thing, not a legislative change?

THE WITNESS: Yeah, the statute remained the same.

THE COURT: But your application changed?

THE WITNESS: Well, their application -- they applied --

THE COURT: I mean your application of the term.

THE WITNESS: Oh. Yes --

THE COURT: Sorry.

THE WITNESS: -- the TCEQ changed its rule.

BY MR. BLACKBURN:

Q So they changed their rules to deny that permit application, correct?

A Well, that's not my recollection of exactly how it worked,

Mr. Blackburn.

Q Well, I would like to hear your recollection.

A Okay. The San Marcos River Foundation applied for an application to leave water into the stream and --

THE COURT: To do what?

THE WITNESS: To leave water in the stream for the environment.

THE COURT: Okay.

BY MR. BLACKBURN:

Q They also applied for 1.15 million --

MR. WILLIS: Your Honor, I'm sorry to interrupt, but he just said that wasn't his understanding of the process and he was explaining his -- and I'd like to just let him --

THE COURT: Right.

MR. WILLIS: -- finish his explanation.

MR. BLACKBURN: I'm sorry, I thought he was through.

THE COURT: Go ahead.

THE WITNESS: And you are correct --

THE COURT: They applied to…?

THE WITNESS: They applied to the TCEQ for a water right permit that would essentially -- their beneficial use was to leave the water in the stream for the benefit of the environment.

THE COURT: Was there a set amount they applied for?

THE WITNESS: Well, there were actually two amounts

involved --

THE COURT: Thanks.

THE WITNESS: -- but one at an upstream location, which I'm not sure what the amount was, one was a downstream location just before the river hit the Guadalupe estuary and my recollection was the amount of water that they were seeking at that location was in the order of 1.15 million acre-feet per year.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q And that was the amount of water that was identified by a Texas Parks and Wildlife FIN study as being a inflow -- as enough water to meet the inflow needs of the San Antonio Bay system, do you know that?

A Not only enough water to meet the needs of the San Antonio Bay system, but the amount of water that would maximize the harvest of fish and seafood or aquatic life in the San Antonio Bay.

Q What's called Max H?

A That is correct.

Q Now, that Max H --

A I'm sorry, can I go back? Because you were asking about my recollection of the --

THE COURT: Yes.

MR. BLACKBURN: I'm sorry.

THE WITNESS: -- the application, and you also said that it was denied based on the TCEQ changing its rule, and that's not my recollection.

THE COURT: What happened.

THE WITNESS: Okay. We got the application. Under direction --

THE COURT: And you were stunned.

THE WITNESS: I was quoted as being stunned, as a matter of fact?

THE COURT: You were?

THE WITNESS: Yes.

(Laughter)

MR. BLACKBURN: He wasn't the only one either.

THE COURT: Okay.

MR. WILLIS: I'm sorry, your Honor, I don't think you're supposed to read clippings on that.

THE COURT: I didn't. I had no idea.

(Laughter)

MR. BLACKBURN: You were just guessing he was stunned, right? I think you're beginning to understand.

THE COURT: Moving along. Sorry.

THE WITNESS: And under direction from the then existing executive director staff began processing that application.

THE COURT: Who was the executive director then?

THE WITNESS: Jeff Segas.

THE COURT: And this was what year?

THE WITNESS: 2000.

MR. BLACKBURN: 2000.

THE WITNESS: Unrelated there was a change in an executive director, but staff was continuing to process the application under the direction that we had received. The -- there were multiple protests. At least one protestant filed a motion with the TCEQ saying that the TCEQ did not have jurisdiction to hear the application or grant the application and therefore the Commission should deny the application.

THE COURT: Who was that?

THE WITNESS: I'm not sure, but I believe it was the Guadalupe-Blanco River Authority that filed that motion.

THE COURT: Is that right? Do you all know?

MR. WILLIS: I don't know, your Honor.

THE COURT: Do they have a representative here?

MR. WILLIS: Blanco River Authority?

MR. BLACKBURN: Guadalupe-Blanco River Authority.

THE WITNESS: I see them nodding in the back.

THE COURT: He said yes.

MR. FERNANDES: Oh, he said yes, and others.

THE COURT: Okay.

THE WITNESS: Okay.

MR. BLACKBURN: He wasn't alone.

THE WITNESS: And the Commission took up that motion before they took up the application. No rule --

THE COURT: That makes sense.

THE WITNESS: No rule had been changed at this time. The Commission decided that it did not have jurisdiction.

THE COURT: Based on…?

THE WITNESS: Based on the statute.

THE COURT: Under what statute?

THE WITNESS: The statute that lays out the benefit -- the purposes for which water rights can be granted.

THE COURT: Okay, so the TCEQ said no jurisdiction to grant -- to recognize this application as an application under the statute?

THE WITNESS: That's correct.

BY MR. BLACKBURN:

Q For what reason?

A That the Legislature had not expressly said this type of application could -- would -- or was the type of use that would qualify to be a water right.

Q So basically the motion was granted on the basis that the statute had not defined bay and estuarine inflows as a beneficial use?

A As a type of use for which you could get a water right.

THE COURT: Has it subsequently done that?

THE WITNESS: Has the --

THE COURT: Legislature subsequently said you can now use this is a --

THE WITNESS: Well --

THE COURT: No?

THE WITNESS: There was an intermediate step. As you can imagine, it got appealed.

THE COURT: Yes.

THE WITNESS: By the time it got to the Supreme Court the Legislature has passed a law that said you could not get a new appropriation for an instream use, but that it would be possible --

THE COURT: Let me understand that. By the time it got to the Supreme Court the Legislature --

THE WITNESS: Had passed a statute --

THE COURT: That said, do you remember the style of it?

THE WITNESS: I'm sorry, I do not. I'm sure --

MR. BLACKBURN: I don't remember right now, your Honor.

THE COURT: It said…?

THE WITNESS: That the Commission could not issue a new appropriation --

THE COURT: Like a new permit?

THE WITNESS: Like a new permit, a new water right, for which the use was an instream use. You know, instead of

municipal or industrial, it would be instream use.

BY MR. BLACKBURN:

Q And would bay and estuarine inflow be included in instream use?

A Yes.

THE COURT: What else would be included in instream use?

THE WITNESS: Well, recreational use, I suppose.

THE COURT: What do you mean?

THE WITNESS: Canoeing. But the essence of the idea was leaving the water in the stream for the environment, not taking it out and putting it to some sort of traditional use, such as municipal or industrial.

THE COURT: Okay, so the end was that it couldn't be -- you couldn't do any of this for environmental purposes?

THE WITNESS: Yes, with a complication.

THE COURT: Okay.

THE WITNESS: And the complication was if there was an existing permit for one of the expressed authorized uses, such as municipal or industrial, you could amend that water right and add instream use as a use.

BY MR. BLACKBURN:

Q But if you were an environmental group --

THE COURT: Hold up.

MR. BLACKBURN: I'm sorry.

THE COURT: So in case they knocked out somebody they wanted to leave in, they put the exception if you've already got a permit and we hadn't thought about you, you can amend it to add instream use?

MR. BLACKBURN: Right, but a new appropriator, like an environmental group that would want to set water aside but had no existing permit, they wouldn't be able to amend.

THE COURT: They don't have one.

THE WITNESS: That's correct.

MR. BLACKBURN: They don't have one.

THE COURT: Does any environmental group have a water permit?

THE WITNESS: Well, actually the San Marcos River Foundation, the applicant in that case, had a small water right that --

THE COURT: Who did?

THE WITNESS: The San Marcos River Foundation.

THE COURT: Oh, the one who --

THE WITNESS: Yes.

MR. BLACKBURN: That was the --

THE COURT: The 40,000 acres.

MR. BLACKBURN: No, no, that was the River Institute. The San Marcos River Foundation was the one that applied for 1.15 million acre-feet and they had an existing water right for, what, 25 acre-feet or something?

THE WITNESS: Yeah, I'm thinking 15, you know, somewhere between 10 and 30.

BY MR. BLACKBURN:

Q Is it disfavor to amend 10 to 30 to get 1.15 million?

A Excuse me?

Q I said could you amend?

A That would be an application for a new appropriation of water, anything on top of whatever the existing right was, so you couldn't do that.

THE COURT: But they could attempt. They could attempt to amend to add.

THE WITNESS: I suppose they could attempt to amend, but the Commission, under our understanding of the statute, would deny it. If you had a thousand acre-feet for municipal use you could add instream use to that thousand acre-feet, but if you were trying to take a thousand acre-feet and amend it to 1.15 million acre-feet and add instream use you couldn't do that. And you had to have some underlying water right.

THE COURT: Why? I skipped something, I know.

THE WITNESS: Well, you're asking me for the collective mind of the Legislature.

THE COURT: I would never do that.

THE WITNESS: Oh, okay.

THE COURT: That would be rude.

THE WITNESS: Well --

THE COURT: Impossible.

(Laughter)

THE WITNESS: In that case --

THE COURT: I didn't -- I wasn't talking about the Legislature, I just thought --

THE WITNESS: Well --

THE COURT: If an existing environmental group, the San Marcos River Foundation, already had a water permit I thought you said they could apply to amend to add more water for end use.

THE WITNESS: No, they can apply to -- they can apply for an amendment to just add that use, but couldn't --

THE COURT: To their original 10,000 or 30,000, or whatever.

THE WITNESS: Ten thousand or --

THE COURT: I got it.

THE WITNESS: -- or ten. You just can't change the amount.

THE COURT: Got it.

BY MR. BLACKBURN:

Q So if I had one for 25 --

THE COURT: Okay, thank you so much.

BY MR. BLACKBURN:

Q -- I could add instream use to my 25?

A That's correct.

Q But I couldn't go and get any additional water. So --
A That's correct.
Q -- essentially addition of any water for bay and estuary or for environmental flow purposes was prohibited except by extension of an existing permitted amount?
A That's correct.
THE COURT: I got it. I would not have wanted your job.
(Laughter)
MR. BLACKBURN: I have a lot of questions along that line, your Honor.
BY MR. BLACKBURN:
Q It gets complicated, doesn't it?
A It sure does.
Q Now, new permits, the Legislature in -- well, let's just talk about it. I want to get a new permit. I come in and I apply. I'm a municipal, Blackburn City. I come in and I apply for a municipal water right. The river, you do the WAM modeling, you look at my new permit application, and the WAM says well, with all of the existing uses, with sort of, if you will, the flow was dependable most of the time, there's no water left. Basically you have allocated the water that's available a hundred percent of the time a hundred percent of that water is allocated. That happens, right?
A Yes.

THE COURT: How does that happen? I mean all water doesn't just dry up at the end of the river, right?

THE WITNESS: Well, that's highly unusual in Texas. I only know of that --

THE COURT: One.

THE WITNESS: -- kind of happening one time. It's more in droughts more likely that the headwaters might dry up.

THE COURT: Right.

THE WITNESS: Right.

BY MR. BLACKBURN:

Q Well, but wherever I am on the river the agency makes an assessment and it would include not only me, but it would include permits that are issued but not fully used in that analysis, correct?

A Not for a new perpetual water right. Well, let me say it another way. It would include all permits in the analysis based upon the amount that's in the permit, not the amount that they use.

Q Right. So you saw the analysis that Mr. Trungale did?

A I saw that analysis.

Q And he did three scenarios, the middle one being sort of the actual use scenario. And then he added over that full use of at least a few permits. Did you see that?

A I saw his analysis, yes.

Q And when the -- that full use of the existing permits was

essentially what you're talking about that is one in the water rights analysis. A new permit is evaluated not only on what's happening in the stream at the moment, but what's happening there, because what all's been spoken for, so to speak --

A That's correct.

Q And then you see what's left after that?

A That's correct.

Q And so you know that river is a hundred percent of the water is allocated a hundred percent of the time based on both usage of under permit and what is fully permitted?

A I would disagree with that statement.

Q Okay. Do you know what the situation is with the Guadalupe and San Antonio Rivers?

A I have a general, very general knowledge of the San Antonio and Guadalupe Rivers. But to do that sort of analysis that you are talking about, it's very site specific and it's very application specific.

What you said though was that a hundred percent of the water, there are some rivers that a hundred percent of the water is a hundred percent of the time has been appropriate. I don't think that's true of any river in Texas, although it might be true of some locations on some rivers in Texas.

THE COURT: Such as?

THE WITNESS: I can't think of a situation that I know for sure, but for example --

THE COURT: So you're just relying on non-use, not a hundred percent use, for it to go downstream.

THE WITNESS: I don't think that's the issue. That's not what I'm talking about with Mr. Blackburn here.

MR. BLACKBURN: Well, that's what I'm talking about.

THE WITNESS: Well, and that's what I'm taking issue with. There are floods and there are droughts. For there to be no -- a hundred percent of the water a hundred percent of the time to be fully permitted, in the case of the Guadalupe that would have to mean that several years ago when there was a flood that overtopped Canyon Reservoir and flooded New Braunfels, that every drop of that water was permitted. And I don't believe that's true at all.

BY MR. BLACKBURN:

Q Okay, well let's take it from the other direction. There is a low flow scenario that is used for allocation purposes, right?

A That is correct.

Q During drought conditions or at least --

A Well --

Q -- close to it?

A Well, you -- the naturalized flow includes low flow situations, such as the drought of record and also other droughts. And so we evaluate the amount of water that is available what percentage of time in that WAM analysis, so --

Q Right. So in evaluating a permit, I'm a new municipality, I would like water that's available a hundred percent of the time. I don't want to depend on Canyon Reservoir being overtop and some huge flow coming down.
A Sure.
Q I want water that's there all the time. So there is analysis that's done by TCEQ of how much water is available a hundred percent of the time.
A Right. Well, you have to satisfy that criteria traditionally to get a municipal permit. So in order to do that in almost every river in every location in Texas for a municipal permit to have a hundred percent of the water available a hundred percent of the time you would have to build a reservoir, a reservoir that would capture the flood coming down the Guadalupe, capture the water in times of plenty, store it so that you have it, you could use it according to your demand schedule.
Q But I'm talking about I want the base flow of the river, that river flow that's available a hundred percent of the time. And my question to you is isn't all of that water allocated -- isn't all of that water that is available a hundred percent of the time pretty much allocated in every river in Texas?
A I couldn't say that for sure in all locations, but for -- away from way down at the bottom of the -- well, actually I just -- to make that statement I would have to -- we would have

to do the water availability analysis and you would have to tell me which locations on the river that you were interested in doing that analysis. And I haven't done that.

Q Are you aware of municipal permits that have been denied on the Guadalupe-San Antonio River system because a hundred percent of the water was not available a hundred percent of the time?

A I can't think of any at this moment. That's not to say that that might not have happened.

Q Let me put it another way. Are you aware of permits that have been issued for water that is available less than a hundred percent of the time?

A Yes.

Q And that's routine, isn't it?

A It's certainly routine for agricultural permits and industrial permits. For municipal permits they have to have an alternative water supply.

Q So you might be able to get 50 percent of your water a hundred percent of the time with a backup groundwater system?

A That's correct.

Q But the implication of that permit is there wasn't a hundred percent of the water a hundred percent of the time.

A That's correct.

Q And TCEQ is issuing these types of permits today, correct?

A That's correct.

Q Are you issuing them on the Guadalupe and San Antonio Rivers?
A Well, my recollection is the last permit that we issued on the Guadalupe was in 2009 -- no, excuse me, 2007. I think 2009 was the San Antonio. And actually I do now recall such a permit that was denied, but -- in the Guadalupe Basin, but I am sure that at -- with the right type of off-channel reservoir and the right diversion rate that yes, we could find someplace on the Guadalupe where the TCEQ might issue that sort of permit.
Q Partial waters from the river have to find backup elsewhere?
A That's right.
Q Because there's not a hundred percent of flow available a hundred percent of the time for municipal purposes?
A Or any other purpose.
Q Now, you were asked some questions about river miles or at least about the 200 miles in from the Gulf.
A Yes.
Q Or from the coast, or however that's measured. And you said, I believe, the Guadalupe is about 450 river miles, is that right?
A More or less, yes.
Q And do you know how many river miles the San Antonio is?
A My recollection was 300-something.

Q And do you know about the Blanco and San Marcos?
A No.
Q Let's just take those two. Not counting any tributaries, that's 450 plus 300, 750, and there's two sides to it, there's two banks, so we're talking about 1500 miles of water frontage just on those rivers, right?
A More or less, yes.
Q More or less. And along that entire 1500 miles every riparian user can stick a straw and use it in the property that's adjacent?
A Just so that we have a common understanding, by riparian user you mean a domestic and livestock user?
Q That's what I'm talking about. I'm not talking about anything that's not -- I don't want to violate the law here.
A Yeah, and I just -- and I just want to be clear because some riparian rights, most riparian rights had to go through the adjudication process and got converted and I just want to make sure that --
Q Right, no, I call those permitted rights. They were riparian, but they got put into the permitting adjudication system. I'm talking about the domestic and livestock exemption.
A Just wanted to be clear.
Q I appreciate that.
A Yes, the domestic and livestock users can stick a straw

into the stream and use the water for domestic and livestock purposes.

Q Just on those two major rivers we've got 1500 miles, more or less, river miles of frontage?

A Right.

Q And that domestic and livestock expands to all of the tributaries, is that right?

A That's correct.

Q Now, there's been a little bit of discussion, I don't know if it was controversy or not, about this 200 acre-foot lake that's over here on the side. Am I allowed to have a 200 acre-foot lake?

A Yes, you're allowed to have a 200 acre-foot lake on your own property for domestic and livestock purposes.

Q And I'm allowed to fill it up is it -- as the water level drops I can fill it back up?

A You can -- as long as you're using the water for domestic and livestock purposes.

Q And just to keep the record clear, to your knowledge is there any reporting system that you are aware of of these domestic and livestock usages?

A No, there's no reporting system in Texas.

Q Are there -- maybe not.

Now, with regard to a new permit application, I come in and I made my application.

A I might interject a little practical note here, if you all will indulge me. The domestic and livestock reservoir has to be on your own property, which means it can't be on a navigable stream, but that's typically where a domestic and livestock reservoir is located, on a stream. So that when you talk about filling it back up, in the typical situation of most domestic and livestock reservoirs you don't just stick a hose into it and fill it back up, you have to wait for the rain to come. So it's -- so your practical typical farmer is not only limited to it has to be used for domestic and livestock, but he's also limited by how much inflow he has into that reservoir. So a minor point, it's --

Q Vanity lakes, are you familiar with the controversy about vanity lakes in San Marcos?

A I've heard some information about the controversy about vanity lakes.

Q What is a vanity lake?

A Well, the parlance of the South Texas Water Master it's a lake that is on the property just so that the property owner -- not for use inside the house, not for use for cows drinking it, but just so the property owner has a pretty lake to look at and maybe fish on or….

Q Now, the controversy in San Marcos came from pumping water out of a river to fill up a vanity lake, correct?

A I'm not aware of that, but it certainly could be.

Q But you're aware of the controversy over vanity lakes in the San Marcos area?
A Yes.
Q Now, new permit, I come in, I apply for one, and they have all of the existing water permits that are out there and I come in and I've got to find some water that's not claimed by one of those permits and I've found it, I come in and I ask for my permit. And you -- your feedback, or by at least the note I wrote, is that the TCEQ considers inflows and considers bays and estuaries if they're within 200 miles of the coast?
A Yes, we consider instream uses, no matter where they're located, and considers flows to the bays and estuaries within 200 river miles of the coast.
Q Now, the bays and estuaries don't have beneficial use classification and instream flows don't have beneficial use, so you don't consider them as beneficial uses and you don't consider them as in the permit system, right?
A That's correct.
Q So how do you consider them?
A Well, the resource protection staff --

THE COURT: I'm sorry, if you don't consider in the permit all the what?

MR. BLACKBURN: If you don't consider them as a beneficial use, such that they actually have some rank in the priority system, how do you consider them? That is I think the

question I was trying to ask.

THE COURT: Thank you.

THE WITNESS: And the staff determines and ultimately the Commission approves or disapproves or adjusts, modifies, a determination of how much water needs to remain in the stream or flow to the bay to maintain a sound ecological environment and then we put those streamflow restrictions in the permit, designed to protect that flow. So there would have to be a flow into the bay or a flow at the river before the water right holder could divert or store water under the permit.

BY MR. BLACKBURN:

Q So under the current permitting authority on the Guadalupe and San Antonio River systems what's the pass through to the bay that is formally acknowledged by the TCEQ?

A Well, there isn't one number, it would be in every permit that we have thought appropriate to put those special streamflow conditions in, and it might vary permit by permit, but --

THE COURT: Well, what are you shooting for? I mean do you have a number?

That's what you're asking, right?

MR. BLACKBURN: That's what I'm asking, yes.

THE COURT: What are you shooting for?

THE WITNESS: Well, the TCEQ has, to the best of my knowledge, has not ever put a number in specifically for flows

to Guadalupe or San Antonio Bay.

MR. BLACKBURN: Thank you.

BY MR. BLACKBURN:

Q Now --

A May -- we have put in streamflow restrictions that are designed to protect the riverine environment and also provide some flows to the bay, so….

Q You're talking about like up at San Marcos?

A I'm talking -- I'm not sure where the location, the locations would be, but there are a very limited number of permits that we have issued in the San Antonio and Guadalupe Bays since -- in the basins since say 1998, when that FIN study was published.

Q But that's upstream, that's not water for the bay, right?

A Well, it's water at the location of the water right that has to pass and it benefits as far downstream as that water goes.

Q Until it gets sucked out by one of the straws.

A Or makes it to the bay.

Q Or makes it. It's kind of like playing dodge ball; it's just trying to get down to the bay.

But no gauge requirement at the entrance to the bay saying how much water has to get to the bay, there's not a single thing like that --

A That's correct.

Q -- on any permit, correct?
A To the best of my knowledge, no.
THE COURT: No salinity requirement?
THE WITNESS: No.
BY MR. BLACKBURN:
Q Now, in addition to considering bay and estuarine inflows, you say that there needs to be a conservation plan for new permitting, is that right?
A That's correct.
Q What is the conservation plan?
A Well, it varies by type of water use, but it's a plan that say a city has to have in place to show that they are going to encourage and conserve water and avoid waste.
Q Now --
THE COURT: Is it fair to say that there really is not an overreaching water plan to provide for the environmental needs of the bays and estuaries of Texas? There's a hope, but not a plan?
THE WITNESS: Well --
THE COURT: There's no plan.
THE WITNESS: There is a plan, there is a state plan and there are various regional plans in Texas to provide for the human population, the needs of the cities and industries and all. And there is --
THE COURT: But not the bays?

THE WITNESS: There is some consideration that varies by region for what the -- what flows should be included for the environment. I think --

THE COURT: But not bays and estuaries in particular?

THE WITNESS: Well, the one example that I know of where they have included it is for the region, and they're all letters and I forget which one it is, the letter, but the region that is immediately above Galveston Bay.

THE COURT: Is that --

THE WITNESS: That --

THE COURT: That's not Lower Colorado --

MR. BLACKBURN: Sabine, you're talking about the Sabine?

THE COURT: That's not the LCRO?

THE WITNESS: No, no. I'm talking -- I don't know if it's Region L or whatever --

MR. BLACKBURN: Well, Region L is Guadalupe-San Antonio.

THE WITNESS: Well, see, I'm sorry, your Honor, I forget these letters, but the region above Galveston Bay has got -- that regional planning group has got some recommended inflows into Galveston Bay.

THE COURT: All right, but for statewide there's just no --

THE WITNESS: Statewide --

THE COURT: -- particular plan --

THE WITNESS: No. No, there isn't.

THE COURT: -- that plans for the protection per se of the bays and estuaries?

THE WITNESS: That's correct.

THE COURT: Okay.

THE WITNESS: And that was also one of the reasons for the Legislature wanting to have Senate Bill 3 and move from a case-by-case basis to a rule basis, because when the regional planning groups were trying to do their plans and looking at different strategies, they knew, if it was a surface water right strategy, that there would be an environmental flow condition.

THE COURT: I understand.

THE WITNESS: Okay. Okay.

THE COURT: I didn't mean to interrupt, go ahead.

THE WITNESS: No, I just wanted to make sure that you understood, and you told me that you did --

THE COURT: Yeah, that --

THE WITNESS: -- and I appreciate that.

THE COURT: -- that that was the reason for SB --

THE WITNESS: SB3.

THE COURT: -- 3.

THE WITNESS: So now the regional --

THE COURT: But now what I'm hearing from you is that

it doesn't -- there is no giant -- there is no state plan --

THE WITNESS: To provide flows for bays and estuaries.

THE COURT: Bays and estuaries.

THE WITNESS: That's correct.

THE COURT: Okay. And apparently SB3 does not do that?

THE WITNESS: Well, it -- the --

THE COURT: I understand what it attempts to do, but it hasn't happened?

THE WITNESS: It hasn't happened yet, but the goal is the regional planning groups will be able to take those numbers, once we get them from the Senate Bill 3 process, and incorporate that in their consideration for the plans that they develop.

THE COURT: Are you going to ask him what happened with the stakeholders?

MR. BLACKBURN: I will get there, yes, your Honor.

THE COURT: Okay, go ahead.

BY MR. BLACKBURN:

Q Back though to Region L, just to be clear, there is a --

THE COURT: Back to us here, we're talking about this?

MR. BLACKBURN: No, you -- I think what region you're in here in Corpus Christi is N.

THE COURT: No, no, I mean our case here.

MR. BLACKBURN: Right, yes, the San Antonio-Guadalupe Bay system.

THE COURT: And I mean all of us, not --

MR. BLACKBURN: Region L is what we are talking about.

BY MR. BLACKBURN:

Q And to your knowledge Region L does not have any bay and estuarine inflows in the planning process, correct?

A To the best of my knowledge that is correct.

Q And let's talk a little bit about Senate Bill 3. Now for starters, Senate Bill 3 has this process that you've described and we have all of these initials. We have the SAC or the Scientific Advisory Committee. We have the -- who are the nine-member committee, the Advisory Committee?

A Environmental Flows Advisory Group, sometimes known as the EFAG.

Q The EFAG? And we have the SAC. We have BBEST and we have BBASC.

A That's correct.

Q And BBEST is the group of scientists that will study a particular bay and estuarine system. They make a scientific recommendation. That recommendation gets passed up to the stakeholder group, which is BBASC, is that right?

A Yes.

Q And then BBASC looks at that and does their own thing with it and they come up with a recommendation that integrates human and economic issues, they include the scientific issues.
A That's correct.
Q And then that gets sent up to the TCEQ for rule making?
A That's correct, along with the comments from the SAC on the scientific, the BBEST recommendations.
Q Now, you follow all of these processes, right?
A Somewhat.
Q Galveston Bay.
A Uh-huh.
Q BBEST --
A Uh-huh.
Q -- makes a recommendation. That went to the BBASC.
A Uh-huh.
Q Their recommendation on Galveston Bay cut down the recommendation of the science -- of the BBEST, right?
A My -- well, the goal of Senate Bill 3 is to come -- to the extent possible, to come up with a consensus basis for the recommendations. In Galveston Bay for the BBEST, the science team, they essentially came up with two recommendations, one from a majority group and one from a minority group. The two groups were the same size except for the majority had one more vote than the minority. So we came up with not a consensus science decision of what the best science was, but we came up

with two divergent views with one vote difference between the majority and minority.

Q In the science group?

A In the science group. Those two recommendations went to the BBASC, the stakeholder group, and they also came up with two recommendations. So --

THE COURT: What were the two recommendations?

THE WITNESS: Well --

THE COURT: We're talking about the stakeholders here?

MR. BLACKBURN: No, this isn't -- I'm talking about the Galveston Bay system.

THE COURT: Galveston Bay.

MR. BLACKBURN: This is one -- the reason I'm asking is that's gone all the way through to the Commission and Commission vote.

THE COURT: Okay.

MR. BLACKBURN: Where as the one we're dealing with has not yet.

THE COURT: Okay.

BY MR. BLACKBURN:

Q So we've got sort of two --

A We've got two and we --

Q -- and two?

A And two.

Q So it goes up to the Commission.
A That's correct.
Q Now, each of those are, I would presume, either different amounts of water for the bay and estuary or different temporal approaches to when the water comes into the bay and how much at different times?
A That's correct.
Q And so disagreements about methodology, impact, things like that at the BBASC level anyway?
A That's right.
Q So it goes up to the Commission.
A That's right.
Q And what did the Commission do?
A Well, under the statute the Commission gets to consider the recommendations of the stakeholder group, the science group, commentaries or comments on the science recommendations by the SAC, as well as public input into the process, into the rule making process, and come up with its own judgment about the appropriate balance between environmental needs and human needs and other public welfare -- public interest considerations. And that's what they did.
Q And didn't they in fact choose a lower number than either the BBEST or the BBASC had recommended by majority?
THE COURT: Of inflow of water?
MR. BLACKBURN: Yes, of inflow.

THE WITNESS: By majority, yes.

BY MR. BLACKBURN:

Q So they basically --

A That's my recommendation.

Q They basically adopted the minority positions form both of those processes and they incorporated that into the rule, correct?

A I wouldn't call it a wholesale adoption of the minority positions. They attempted to do their own balancing, given the competing interests, and to the best of their ability come up with the appropriate balance between all the competing interests.

Q But the stakeholder group, that was what I heard they were supposed to do, that was where those competing interests came in, and they had voted to a certain number that was reduced by the Commission, right?

A The -- my understanding of the Senate Bill 3 process is the Commission always gets to make its own independent determination of the appropriate balance. It -- even if -- and I can't imagine the -- well, I --

THE COURT: It's all right, Mr. Willis.

THE WITNESS: So the Commission gets to make its independent determination. To do otherwise would really circumvent the Administrative Procedures Act and what it means to do rule making in the state of Texas, because that would be

basically saying well, we're going to take public comments but we're not going to consider them because we're going to be bound by the stakeholder recommendations. I don't think that's what was contemplated by the Senate Bill 3 process. And I think in the Galveston Bay situation they were considering both the majority and minority reports for both the BBASC and BBEST and doing their --

THE COURT: What were the public comments? Who were the public that make the comments that obviously swayed the lower rate?

THE WITNESS: Well, I don't remember specific comments, but I --

THE COURT: Who?

THE WITNESS: Here's what I do remember, a group of entities came to the Commission and objected to the proposal and wanted lower streamflow conditions and that coalition included the City of Houston and the City of Dallas and the Commission declined to follow their recommendations and dilute the proposal.

THE COURT: But they lowered the flow apparently. Is that right? What he said, right, that they lowered --

THE WITNESS: It was --

THE COURT: -- the flow of freshwater from either the -- from both the recommendations of the science and the stakeholders.

THE WITNESS: From the majority positions of the stakeholders --

THE COURT: Okay.

THE WITNESS: -- and the BBEST, yes.

THE COURT: So then I wasn't going to assume it was public comments, that was the reason for the public comments to take that --

THE WITNESS: Well --

THE COURT: So besides the cities, was there anybody else?

THE WITNESS: Well, there were a substantial number of people on the stakeholder group that filed that minority report. I think that was --

THE COURT: I see.

THE WITNESS: -- a major driver for the ultimate rule that we got.

THE COURT: And who were those, substantial people who were stakeholders?

THE WITNESS: I'm sorry, I do know that there were some river authorities, some -- but I'd have to go back and refresh my memory from those reports.

BY MR. BLACKBURN:

Q It was basically water users, water appropriators, water diverters of various sorts, would that be fair?

A I think that would be -- make up the majority of -- the

majority of the minority, yes.
Q And are you aware that the Galveston Bay Foundation put out a, really almost an urgent alert, emergency alert that essentially what had happened at the TCEQ would destroy Galveston Bay system?
A I am aware that they put out that and were upset with the Commission's decision.
Q Now, let's go to the Guadalupe-San Antonio River system. BBEST --

THE COURT: So wait, slow down. Sorry.

MR. BLACKBURN: Surely.

(Pause)

THE COURT: Okay.

BY MR. BLACKBURN:

Q BBEST --

THE COURT: For which system?

MR. BLACKBURN: San Antonio-Guadalupe.

THE COURT: Oh, oh, the one here, L.

MR. BLACKBURN: The one here now.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Now, let me ask you this, if there's consensus out of the BBEST would the Commission feel compelled to follow a consensus out of the BBEST?

THE COURT: I'm sorry, I'm going to object to that.

How could he know that?

MR. BLACKBURN: Under the law, under the --

THE COURT: Oh.

MR. BLACKBURN: -- under the regulations. Not under -- not how they think, but what kind of the ground rules are.

THE COURT: Well, no, because we just said that, you know, they have public comment and so --

Isn't that right?

THE WITNESS: Yes.

THE COURT: So they're not compelled to do anything but go through the process.

THE WITNESS: Go through the process and consider --

THE COURT: And listen to all the different --

THE WITNESS: All the different sides, yes.

THE COURT: And that's all they're compelled to do, they're not compelled to follow any scientific recommendation or any stakeholder recommendation or public recommendation.

THE WITNESS: That's correct. They are compelled to come up with an answer, to come up with environmental flow standards.

BY MR. BLACKBURN:

Q Now, whether answer they come up with from an environmental flows perspective, let's just pick a number, a million acre-feet. That million acre-feet gets set over here

on the side and I can't appropriate water to make that happen because that's prohibited, right?

A This is where it gets really complicated. There are different ways that the BBEST and BBASC have recommended to do the modeling and consider environmental flow standards in the permitting process. There's also a mechanism -- there's the standards, the environmental flow standards under Senate Bill 3, and there are set asides under Senate Bill 3. The set asides under Senate Bill 3 are only unappropriated water that can be set aside, and that's a slightly different animal than just the environmental flow standards.

Q And can they be cancelled during times of drought?

A The standards? No.

Q No, the set asides.

THE COURT: The set asides.

A The set asides? They can -- there is a provision for in an emergency for making them available to --

Q So the set asides are not really set asides in times of drought if the water is needed elsewhere?

A If the Commission finds -- makes the findings under the statute that water can be allocated to other uses.

Q So it's a non-set aside set aside?

MR. WILLIS: Objection, your Honor --

MR. BLACKBURN: I'll withdraw.

THE COURT: I got what it is.

MR. WILLIS: I needed to stand up for a second. I apologize.

THE COURT: Go ahead. Walk around if you want.

(Laughter)

MR. BLACKBURN: You want to come up here?

MR. WILLIS: You're doing a great job.

BY MR. BLACKBURN:

Q Now -- by the way, climate change came up a while ago. Isn't it true that Chairman Shaw of the TCEQ has denied the existence of climate change?

A I don't have any knowledge of that.

Q Is there an official position of the TCEQ on climate change?

A I have not seen -- I wouldn't know what an official position of the TCEQ would look like except for a Commission Order. I have not seen one on that.

MR. WILLIS: Your Honor, I really don't understand why we're going to start talking about the position on climate change in a lawsuit against TCEQ --

THE COURT: I started talking about it.

MR. BLACKBURN: That's why I'm talking about it.

THE COURT: It's me that brought it up.

MR. WILLIS: So if the Court --

THE COURT: In looking at the historical water, you know, from the 30s to 80 whatever he said he assumed that

modeling was assuming that the past would predict the future, which climate change says that is not the case. And if -- unless anybody's got an expert that says there is no such thing as climate change, then I'm assuming from the experts I've heard, the first one that said it's a climate catastrophe, not a climate change, but that there is climate change.

MR. WILLIS: Okay.

THE COURT: Is that fair?

MR. WILLIS: Do I think it's fair if the lawsuit has evolved -- or that the questioning to this witness, who is brought forth as a fact witness on specific issues related to permitting, that it would now evolve on his opinion as to the commissioners, his bosses, whether they believe in climate change or not, no I don't think that's fair. But if the Court wants to inquire as to climate change issues, I certainly understand that. I just don't know that this is -- these are fair questions for this witness is what my point was I guess. He's not a scientist.

THE COURT: They may not be. They may not be.

MR. BLACKBURN: I'll go on.

BY MR. BLACKBURN:

Q Sewage treatment, return flows, are return flows depended upon by downstream users for withdrawals?

THE COURT: Tell me again, Mr. Chenoweth, what is your position at the TCEQ?

THE WITNESS: I'm an assistant special counsel to the deputy for the Office of Water.

THE COURT: Okay, thank you.

Okay, go ahead.

BY MR. BLACKBURN:

Q Return flows, treated sewage, a municipality uses water, toilets get flushed, clothes get washed, wastewater gets produced from a wastewater plant, discharged into a river, does that kind of go back into the inventory of water to be allocated?

A It doesn't go back into the inventory to be allocated for new perpetual permits.

THE COURT: Is the -- just out of curiosity, now he's got me interested, is the commissioner chair of the Commission going to be here?

MR. WILLIS: I'm sorry, your Honor?

THE COURT: The chair of the TCEQ?

MR. WILLIS: He's not on our witness list to be called.

THE COURT: Okay.

MR. BLACKBURN: We would not object to adding him if they want to.

THE COURT: I don't think they're going to want to --

MR. BLACKBURN: I don't think --

THE COURT: -- go ahead. Moving on.

(Laughter)

BY MR. BLACKBURN:

Q Return flows, not allocated, so the City of Houston's will -- my question was do they -- are they considered in the return -- like in your modeling, are return flows added back to the stream or once they're taken out are they maintained out on the water availability model?

A For new perpetual rights they are not added back into the system.

Q So the assumption is from a permitting standpoint once that water is withdrawn it's gone?

A That's correct.

Q So when --

THE COURT: Well, even if the permit calls for a return?

THE WITNESS: Not -- if the permit is caused -- has a special condition in that says --

THE COURT: Right.

THE WITNESS: -- you know, 40 percent or "X" acre-feet has to be returned, that would be added back in in the model.

THE COURT: Oh, okay.

THE WITNESS: It's just that that's an atypical situation.

//

BY MR. BLACKBURN:

Q Now, do you know when did the TCEQ start putting return flow requirements on permits?

A Return flow requirements such as…?

Q Like I have to return 50 percent of the water I take out.

A I'm not sure when they started. I don't even know that they did it consistently for any period of time.

Q So you've got one here and one there, but not a consistent policy of return flow requirements?

A Yes, to the best of my knowledge I don't know of any specific time that they had a policy to always include those conditions. Maybe, but I just --

Q But they could?

A Actually, I -- at one point I remember a discussion about that and the chairman at the time suggested that he thought it could only be done with legislative authorization that we didn't have.

Q So essentially there was a discussion that in fact you lacked the authority to require return flows?

A To require a specific amount of water to be returned to the stream.

Q Now --

A You know, I might just add a footnote to your comment about return flows being added back into the model and that is true about new permits that we issue. During the adjudication

process adjudicated water rights were based on historical use and there was no consideration for water availability so some water -- some people may have gotten -- have used water historically and gotten a certificate of adjudication based on availability of return flows.

Q So in that situation that water availability would have been based on at least a false assumption under the current interpretation that return flows are not required?

A Well, as I said, there was no water availability determination made during the adjudication process, it was only a determination as to whether water had been historically used and in what amounts.

MR. BLACKBURN: Now I apologize, your Honor, for jumping around, but there's something else that I want to keep coming -- I want to come back to, Senate Bill 3 again.

BY MR. BLACKBURN:

Q We have a target, however derived, whoever made it, at some point TCEQ commissioners vote, we get a target amount. It's over here. This 12 percent rule, I want to talk a little bit about that.

Let's say a target for flow in a stream is 200 cfs. Let's say at the current time only a hundred cfs is dependable. How does that work?

A Well, in all likelihood, if 100 is dependable, I'm not sure, you know, specific frequency of dependability, and the

target is -- or the streamflow restriction will be, at least in some months under some climatological conditions that it has to be 200, that will be factored into the availability determination before you see if the proposed permit can get the amount of water that will meet its availability criteria.

So just for a simplistic hypothetical, if the flow is always 100 cfs and the streamflow restriction is 200 cfs, then no water will be found to be available and the permit will be denied.

Q So that would apply to a new permit period?

A That's correct.

Senate Bill 3 also says that there should be a consideration for strategies in cases where the flow conditions don't meet the standard there will be an examination of alternative strategies for coming up with those flows and it specifically mentions market approaches.

Q So somehow buying water rights and putting them in trust and setting them aside would be consistent there?

A It's one thing that's to be considered as a possible strategy for coming -- meeting those flow standards.

Q Now, SEPs.

A Uh-huh.

Q Supplemental environmental projects?

A Yeah.

Q SEPs are based on fines, right?

A That's correct.
Q So if I violate the law I'm going to have to pay money into something and I could put it into an environmental project rather than into the general treasury?
A I'm having difficulty believing the hypothetical that you would violate some environmental law, but --
(Laughter)
Q I know, it's a staggering concept.
A If it were to occur, that's the way it would work.
Q And you've hit me hard.
(Laughter)
My million dollars, can I put it anywhere right now? Could I come to you and say I'm an air pollution violator; can I put it into a water project right now?
A Historically the way that it has worked is that air violation money goes to air violation projects or remediation projects, such as air monitoring stations, that sort of thing. It doesn't cross media. That's the way it's been traditionally done up to this point in time.
Q But when we're talking about SEPs being used for something related to this litigation, air pollution fines, at least under historic practices, wouldn't be available, right?
THE COURT: Not for this.
//
//

BY MR. BLACKBURN:

Q Not for this?

A Not for this, not historically, not --

THE COURT: So what would be available? What kind of a SEP would you put up --

MR. BLACKBURN: I guess if I violated a wastewater program that would be a water violation.

BY MR. BLACKBURN:

Q But do I have to be in the basin?

A Well, as I understand it, you have to be in the area so that violators are doing projects in their area, at least traditionally.

Q So you couldn't benefit from all the fine money from Houston that's potentially available?

THE COURT: I don't think that that's correct.

THE WITNESS: Well, and I'm --

THE COURT: That may be historical, I'm not sure that it's a requirement.

MR. BLACKBURN: I'm not sure either. I'm just trying to understand practice, if you would.

THE COURT: Does anybody know? That doesn't sound --

MR. WILLIS: Well, I think that's a good question. And that's what I was going to say, is that maybe he could answer that if historically they've done it or if there is any kind of requirements under any agency.

THE WITNESS: I'm not aware of any statutory restrictions on that. I'm not even aware that it's a TCEQ rule. It's been the practice, but --

THE COURT: And it stands to reason.

MR. BLACKBURN: Well, it makes sense. I mean I understand why you've done it that way. I'm just trying to understand some of the practical difficulties about --

THE COURT: Setting up a SEP for here.

MR. BLACKBURN: Exactly. I mean I'm just trying to figure out what we're trying to -- you know, if we're swimming upstream a little bit.

THE COURT: Because, you know, if Houston were injured with an environmental catastrophe the remediation or the SEP money should go there for the project.

MR. BLACKBURN: Makes sense.

THE COURT: The same thing with here. So the injury would be a little hard to find unless we had, God forbid, an oil spill to the bay.

MR. BLACKBURN: And that would be why we were talking earlier about the NRDA damages, because those were Gulf-wide and --

THE COURT: Gulf-wide.

MR. BLACKBURN: -- and you could make some sort of claim on that money --

THE COURT: Some nexus to our bay here with that

money.

MR. BLACKBURN: Exactly, but --

BY MR. BLACKBURN:

Q And the last question is does the person who has been fined have a say in what their SEP money goes into?

A I understand they have some say in that, but I'm not real sure on that point.

Q But potentially at least it needs to be the same media within the same basin with the concurrence of the person who's the violator?

A Yes, to the best of my knowledge. And I'm not expressing any opinion on what the Commission might do in the future or in a SEP for this case.

THE COURT: Yes.

MR. BLACKBURN: No, I certainly understand that.

THE COURT: So your point is it might be a very limited remedy.

MR. BLACKBURN: That's my point.

MR. WILLIS: I'm sorry?

THE COURT: His point is that a SEP might be a limited remedy. But a SEP could be part of a remedy, it wouldn't have to be -- I never imagined that it would be -- just from my own experience with the SEPs for air monitoring it's just -- it's some, but it's not near the initial investment. And it has to be -- you know, the people that pay

the air violations, the refineries locally, and it goes into that SEP that benefits the air monitoring program.

MR. BLACKBURN: Which is an excellent thing. And I'm not opposed to the concept. I just wanted to just at least temper our expectations with a little practicality and --

THE COURT: I have no problem with that tempering. I was already there.

MR. BLACKBURN: And I guess the last kind of set of questions that I have have to do with the expert report that Larry Soward produced and --

THE COURT: The what?

MR. BLACKBURN: The Larry Soward report. It is a -- what is that?

THE COURT: Have you read it?

THE WITNESS: I have read it.

THE COURT: Okay. It was the one we introduced --

MR. BLACKBURN: That was the one that --

THE COURT: -- yesterday.

MR. BLACKBURN: -- the Defense offered and --

MR. WILLIS: It's in evidence.

THE COURT: By accident.

MR. UNIDENTIFIED: 397.

MR. BLACKBURN: I think it's 397. But that would require an opinion and he's not an opinion witness, so I'll pass the witness, your Honor.

THE COURT: Thank you.

MR. WILLIS: Nothing further for this witness, your Honor.

THE COURT: Thank you, sir, you may stand down.

(Witness excused)

MR. WILLIS: I've got a question for the Court though, your Honor.

THE COURT: Yes, sir.

MR. WILLIS: Since it is a few minutes before 5:00, based on what we discussed just prior to lunch rather than start with another witness that we think will probably not get finished from the Defense side, we would like to if the Court would indulge us to maybe let's start some of the discussion this afternoon that we had talked about before lunch.

THE COURT: That would be fine. So we'll go into mediation.

MS. SNAPKA: I clarified with Ms. Tracy that the previous Amended Mediation Order is still in effect.

THE COURT: Yes.

MS. SNAPKA: That's what we were waiting on.

THE COURT: Ms. Cayce.

MS. SNAPKA: Ms. Cayce. I'm sorry.

THE COURT: That's all right.

MR. WILLIS: I discussed this with Mr. Blackburn earlier and he thought --

THE COURT: Is that all right, Mr. Blackburn?

MR. BLACKBURN: Oh, absolutely, your Honor.

THE COURT: So this is unusual, because in over 17 years I've never done this, but I have an Amended Mediation Order in effect that if the parties want they can mediate. I have offered to be their mediator. There is a Confidentiality Order attached as part of the Order for Mediation so that anyone that the parties do not want in the mediation don't participate in the mediation and there's no record of the mediation either.

Is that correct? Did I say that right?

MS. SNAPKA: Yes, your Honor, that's my understanding. And it's not who the parties don't want, mediations traditionally are limited to counsel and the parties.

THE COURT: I didn't mean that. I meant that there are so many people, you've got experts, you've got this, it's only the parties and their witnesses or experts can be in the mediation.

MS. SNAPKA: That's correct.

THE COURT: So anyone who is not a party, not a witness designated to be here by the attorney, needs to leave at this point.

MS. SNAPKA: Additionally, the parties I'm sure the Court will instruct are bound by confidentiality, they can't

discuss it with anybody else.

THE COURT: And you cannot, by the way -- let's just whip out 25 copies of those Amended Mediation Orders.

MS. SNAPKA: Your Honor, I've had a request for clarification. Can we leave our boxes here over the weekend or do we have to cart them all back?

THE COURT: Yes, I have nothing scheduled. I've got jury duty 8:00 o'clock Monday morning and nothing scheduled in the morning. I thought you all wanted the afternoon as well for this. If you don't, I can put criminal stuff on.

MS. SNAPKA: Go ahead and put the criminal stuff on, because I think we're going to need Monday afternoon for preparation to begin Tuesday morning --

THE COURT: Fine.

MS. SNAPKA: -- because we're going to get this taken -- get this started now.

THE COURT: Yes, thank you.

(This proceeding was adjourned at 5:00 p.m.)

CERTIFICATION

I certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

January 26, 2012

Signed **Dated**

TONI HUDSON, TRANSCRIBER

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	)	CASE NO: CA-C-10-075
	)	
Plaintiff,	)	CIVIL
	)	
vs.	)	Corpus Christi, Texas
	)	
BRYAN SHAW, ET AL,	)	Tuesday, December 13, 2011
	)	(8:36 a.m. to 10:02 a.m.)
Defendants.	)	(10:20 a.m. to 11:57 a.m.)
		(1:30 p.m. to 3:02 p.m.)
		(3:28 p.m. to 4:42 p.m.)
		(5:05 p.m. to 6:01 p.m.)

BENCH TRIAL - DAY 6

BEFORE THE HONORABLE JANIS GRAHAM JACK,
UNITED STATES DISTRICT JUDGE

Appearances:	See next page
Court Recorder:	Velma Gano
Courtroom Clerk:	Lori Cayce
Transcribed by:	Exceptional Reporting Services, Inc. P.O. Box 18668 Corpus Christi, TX 78480-8668 361 949-2988

Proceedings recorded by electronic sound recording;
transcript produced by transcription service.

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Corpus Christi, Texas; Tuesday, December 13, 2011; 8:36 a.m.

(Call to Order)

THE MARSHAL: All rise.

THE COURT: Thank you. You may be seated.

Ready? First witness?

MR. FERNANDES: Your Honor, before we get started, if we can handle a couple of housekeeping --

THE COURT: Sure.

MR. FERNANDES: -- matters and some exhibits.

MR. TAYLOR: Your Honor, before the first witness, defendants will offer some exhibits: Defendants' Exhibit 223 and Defendants' Exhibits 399 through 423.

(Pause; Mr. Taylor and Mr. Waites confer off the record)

MR. WAITES: No objection, your Honor.

THE COURT: All right. Then, those are admitted. Thank you.

(Defendants' Exhibits Numbers 223 and Numbers 399 through 423 were received in evidence)

MR. WAITES: All right. And if I may, at this time, plaintiffs would offer the following plaintiff's exhibits: 16, 17, 204, 206, 207, 211, and 382 to 387.

MR. TAYLOR: No objection, your Honor.

THE COURT: Those are admitted.

(Plaintiff's Exhibits Numbers 16, 17, 204, 206, 207, 211, and 382 to 387 were received in evidence)

MR. WAITES: Thank you.

MR. FERNANDES: May we proceed, your Honor?

THE COURT: Please.

MR. FERNANDES: Defendants call Richard Stroud.

(Witness Summoned; pause)

RICHARD STROUD, DEFENDANTS' WITNESS, SWORN

(Pause; Court confers with the Clerk)

THE COURT: Okay.

DIRECT EXAMINATION

BY MR. FERNANDES:

Q Dr. Stroud, please introduce yourself to the Court.

A My name is Richard Kim Stroud, S-T-R-O-U-D.

Q Let’s talk about your background. Let’s look at Defendants' Exhibit 371, please.

Let’s look at the top half of -- first of all, is that a true and correct copy of your C.V.?

A Yes. It is.

Q Let’s look at the top half of the C.V. Now, I see under “discipline” it says:

“Veterinary pathology, determination of cause of death and other pathology-based evaluations in animals, including domestic and wildlife, forensic evaluation of biological evidence.”

What does all of that mean?

A The pathology is the study of changes in tissues and in

carcasses that would lead to indicate disease and/or injury. Veterinary, of course, is a reference to animals. And the forensic evaluation of biological evidence, biological evidence meaning -- could be carcasses, could be portions of carcasses, could be other types of evidence that may have some indication of disease or injury. That "forensic" refers to "for the court" and is a legal designation of what kind of examinations I did.

Q Now, did you obtain your bachelor of science degree in fish and wildlife biology from Oregon State University?

A Yes, I did. My career basically started out as a wildlife biologist because that was my interests. From there I morphed that into veterinary pathology, because veterinary pathology I believe is an important tool that can be used to help solve problems, identify problems in the fisheries and wildlife field, which is really my first interest.

Q And why did you --

THE COURT: Is this a specialty where you take those exams in Iowa or someplace? Forensic pathology; veterinary pathology?

THE WITNESS: There are currently no exams that I am aware of that are, quote, "qualifying exams" for forensics in veterinary medicine. There are training programs in forensics. I have attended several, specifically, and one of those is in St. Louis; the St. Louis School of Medicine has forensic

pathology training. The Armed Forces Institute of Pathology --

THE COURT: No, it's not a training; it's some kind of a -- it's some kind of a board specialization, I just wondered.

THE WITNESS: Not in veterinary forensics.

THE COURT: I thought it was pathology; veterinary pathology.

THE WITNESS: But there is a board certification in veterinary pathology, and that is given, depending on the year, it's given in association with the ACVP meetings, which is American College of Veterinary Pathologists, and they can be in multiple places throughout the country. Yes.

THE COURT: Are you board certified in that?

THE WITNESS: I am not board certified in the ACVP program. I'm board eligible. I had up to the point of taking the boards, but my career choice was fish and wildlife, and later on into forensic veterinary medicine. The boards really are more of a test of domestic animal and/or laboratory animal pathology, and that's kind of a career --

THE COURT: I wasn't testing your qualifications.

THE WITNESS: Yeah.

THE COURT: My niece took those boards, and I was wondering --

THE WITNESS: Okay.

THE COURT: -- what they meant. So --

THE WITNESS: Yeah. They're primarily for pathologists that are working with either domestic animals and/or laboratory animal pathology for industry.

THE COURT: But she has a Ph.D. and the D.V.M. --

THE WITNESS: Yeah.

THE COURT: -- also, and was doing something with small animals.

Sorry. Diverted.

MR. FERNANDES: May I approach so I can give him a laser pointer?

THE COURT: Sure.

THE WITNESS: I think there's one here. Yes.

BY MR. FERNANDES:

Q I noticed that you did your residency at the San Diego Zoo Society. What did all of that entail?

A That was a hands-on comparative pathology residency in which all of the animals that would die or were submitted to the San Diego Zoo and/or Wild Animal Park were always examined for cause of death, monitoring of the health status of the zoo captive population. It was a very important and a primary purpose of that.

Q Now, let's talk briefly about your work experience. Let's go to page two of your C.V.

First let's talk about your employment during the period August of 1980 to April of 1982.

What was your position at the U.S. Fish and Wildlife Service from 1980 to 1982?

A Well, I was very fortunate to be part of the first cadre of scientists that were employed at this newly established laboratory in Madison, Wisconsin. The laboratory was established primarily as a service to the National Wildlife Refuge System of the U.S. Fish and Wildlife Service. We also did work for some of the state wildlife agencies. And as the laboratory developed, we started in trailers, actually, adjacent to the veterinary diagnostic lab, the state of Wisconsin veterinary diagnostic lab, and then we designed and built facilities, and within the next couple of years, and we developed all our protocols for handling wildlife, and that's what established our own U.S. Fish and Wildlife Service laboratory designated as the National Wildlife Health Laboratory. As we developed more capability, particularly in research, it became known as the National Wildlife Health Research Center in later years.

Q Between 1982 and 1987, were you the chief diagnostic service wildlife pathologist at the National Wildlife Health Research Center?

A Yes. I was responsible for the section which was dedicated to processing the submitted samples from the field. So, that was the diagnostic section group. And that included the pathologists, and it also included the ancillary scientific

disciplines, such as bacteriology, chemistry, parasitology, which oftentimes are used to support pathologic diagnoses. There are other segments of the laboratory. There was a field response segment, which is in addition, and then there was several others developed along research lines to study further particular problems within the field of wildlife disease.

Q Now, did the National Wildlife Health Research Center later become the National Wildlife Health Center?

A Yes. I believe they've had several different name changes as it relates to -- they were moved, actually, from U.S. Fish and Wildlife Service into Geological Services. This was kind of a political thing; and they did some name changing at that time.

Q So, were you among the veterinarians who helped create what is now known as the National Wildlife Health Center?

A Yes. I was part of that initial cadre of scientists that developed both facilities and/or protocols of what we did to service the wildlife system.

Q And how many pathologists were at the National Wildlife -- what is now the National Wildlife Health Center when you began there?

A Initially there was three of us that actually did all the cutting of the carcasses.

Q Now, let's look at the period between 1980 all the way to 1987, the period of time that you were at the U.S. Fish and

Wildlife Service.

What did you do during that period of time, from 1980 to 1987?

THE COURT: Was this on the campus of the University of Wisconsin?

THE WITNESS: No; it was not --

THE COURT: Because they have a veterinary school.

THE WITNESS: -- directly on campus.

THE COURT: Okay.

THE WITNESS: The concepts originally kind of started on campus, but then we had our own facility out on Schroeder Road --

THE COURT: Okay.

THE WITNESS: -- which is not too far from the campus, and we did have links back and forth to the campus and the scientists there at University of Wisconsin.

THE COURT: Is it where the veterinary school is in Madison?

THE WITNESS: That's correct.

THE COURT: Okay. Thanks.

THE WITNESS: The veterinary school is on campus there.

BY MR. FERNANDES:

Q So, between 1980 and 1987, what did you do while you were at the U.S. Fish and Wildlife Service?

A My primary duty was to examine carcasses submitted from the field, and, then, my supervisory responsibilities were then to make sure that the laboratories that supported those diagnoses were maintained and the -- supervised the technicians and the scientists and other folks that added to that diagnostic service. And, then, of course, to review those products of our service; that is, the necropsy reports, and to then communicate that kind of information to the field and also to involve the what was called the Wildlife Health Resource Team, which was the kind of the field arm of the laboratory at that time.

Q Between 1980 and 1987, did you actually perform necropsies?

A Yes. I performed several thousand necropsies, at least. I have no way of really counting exactly how many.

Q And what is a "necropsy"?

A A necropsy is -- in the Greek it says "death study," "necro," "study." And it is used in the context of veterinary medicine the same as an autopsy terminology is used in human medicine. It is the, basically, the organized examination of a dead animal, including the external lesions that one might see, the internal lesions that one might see, on a gross examination, that is, with your eyes, and then the taking of tissues that would be used in the microscopic examination of the tissues; they would be prepared for histopathology. And,

then, in addition to that, the taking of appropriate samples for bacteriology, virology, collecting parasites, all of these ancillary laboratory services which assist the pathologist in coming to a conclusion.

Q How many necropsies -- approximately how many necropsies have you performed during your career?

A Oh, I'm sure I must be well over 10,000 necropsies of various species of animals ranging anywhere from the size of a hummingbird to -- actually, I've done whales.

Q Now, of those necropsies that you've performed, how many were birds?

A Roughly 80 percent were birds. That's mainly because the National Wildlife Refuge system does cater more to birds, and the important species, migratory bird species, that were submitted in there were primarily birds.

Q Have you performed necropsies on whooping cranes?

A I have.

Q How many?

A While I was at the Wildlife Health Lab, I did two, the kind of the first two that came in there, back in 1983. Since then, I've done a couple more that were forensic-related cases when I was employed in another laboratory, which is later on.

Q Now, were both of the whooping crane carcasses that you examined found on the wintering grounds at Aransas?

A No. One was found on the wintering grounds, and one was

found, I believe, up near Fort Worth someplace.
Q Now, let's talk briefly about the necropsy that you performed on the whooping crane that was found at Aransas.
What was the cause of death of that crane?
A I think that the primary cause of death was it was predated, but then it had basically a systemic infection, a whole-body infection of avian tuberculosis and a concurrent infection of salmonellosis, which is -- salmonella is a bacteria that would be invasive of the intestinal tract. Tuberculosis is a bacterial organism which causes granulomas or big kind of tumor-like lesions throughout the body.
Q Now, did you publish your findings relating to that crane?
A Yes. I published those in the Journal of Wildlife Diseases, which is the primary professional journal for the area of wildlife diseases and for the people that deal with that.
Q And why did you publish those findings?
A Well, they were unique, and it was -- because it was a whooping crane to start with, this was -- it was very important to document that it was in the whooping crane population. It was also important because it was such a diffuse, involved case in that crane that it -- it made a very nice publication. In addition to that, there was a concurrent infection, that just shows how diseases oftentimes work in multiples.
Q Just so we're clear, had avian tuberculosis ever been

found in the whooping crane prior to that necropsy that you performed?

A No. It had -- I mean, it's well known in many wild species of birds, but that was the first one in a whooping crane, actually.

Q Now, let's talk briefly about the period of time 1987 to 1990.

What did you do in your position as regional environmental contaminants coordinator?

A This was a position in the regional office of region one of the U.S. Fish and Wildlife Service. It was primarily an administrative technical scientist advisory type of position. I had responsibility for one of the major programs of the Fish and Wildlife Service, and this involved the investigation -- they have multiple field investigation projects going on in the states of Oregon, Washington, Idaho, Nevada, California, and Hawaii. That was region one at the time. And these would be projects that would seek to evaluate toxilogic insult to the environment that might affect the wildlife living there.

For instance, that was the period of time in which the Kesterson selenium problem had appeared, in which there were agricultural drain water which was collecting selenium, which is a trace metal, and they were using this drain water from the irrigation canals to put water in the wildlife refuges. Well, this was bringing in excess amounts of

selenium, which then was being put into the environment, into the foodstuffs, and the insects, and all of the other things that ducks and geese and other water birds might eat, and, therefore, causing in those water birds pathologic lesions, birth deformities, that type of thing.

I also dealt with pesticide applications which would kill birds, either acutely or more chronically. I dealt with oil spill mortalities of birds. I dealt with cyanide leach mine mortalities. Cyanide is extracted using -- or cyanide is used to extract gold from low-grade soil or -- and then these -- this cyanide-laced water was then put out into desert areas and birds would come to it and be killed that way. So --

Q Let's go to page one of your C.V. I need to see a little bit more to the left-hand side.

Now, I want to focus on the period of time 1990 to 2009. During those 19 years, were you the top medical examiner for the U.S. Fish and Wildlife Service?

A Yes. That was another one of those very fortunate career opportunities. The U.S. Fish and Wildlife Service division of law enforcement had established a laboratory in Ashland, Oregon, in 1989, that had just opened, and this laboratory's purpose was to provide the forensic backup for wildlife officers of the U.S. Fish and Wildlife Service, and this was geared specifically to just processing material from wildlife law enforcement cases. And being that it was in the same

region that I was already employed in, they asked me to come down and establish the part of that laboratory which dealt with the examination of carcasses, and, therefore, what that did is create the analogous to a medical examiner. Then it became a veterinary medical examiner kind of a position, and we -- I established that and the protocols and the capability to process wildlife from all over the country.

Q Well, did you offer expert opinions on behalf of the prosecution on cause of death in your role as the veterinary medical examiner?

A Yes. My job was primarily to support prosecution of cases, to examine the carcass, document very thoroughly what it was that I found, and then be able to present this in a court of law as a expert witness for the prosecution.

Q And approximately how many times were you called to testify in court to express your opinions on cause of death on behalf of the prosecution while you were the chief medical examiner at the Fish and Wildlife Service?

A I actually testified in a little over 30 cases. I prepared many other cases which went to court, which they either settled on prior to my arrival or they stipulated to my reports. And, in fact, I actually did one case right here in this building about five years ago having to do with oiled birds from the Citgo plant out here. And, so, I have appeared in both federal and state court as an expert witness.

Q Now, did you have a role in developing the area of forensic veterinary pathology?

A Yes. I'd like to think I was kind of one of the pioneers of this area, which has just in recent years actually become quite popular within the veterinary circles. Prior to this, there was very few -- there were very few -- in fact, I'm the only -- myself and the veterinarian who was my assistant were the only full-time veterinary pathologists that actually worked with forensics full time in the United States and, as far as we knew, the world.

So, this was kind of an exciting period of time, because what we did is take a lot of the concepts and the protocols that were used in forensics elsewhere, other types of forensic scientists, such as ballistics, forensic chemistry, forensic photography and crime scene investigation and all of that, and actually brought that back into the area of veterinary pathology as it related to wildlife species.

Q Now, how does forensic diagnostic pathology differ from other forms of veterinary diagnostic pathology?

A Generally speaking, a veterinary pathologist that -- the type that you find in veterinary diagnostic service labs, the veterinarian's primary purpose there is to identify the cause of disease and be able to report that back out to the submitter so that they could do something about the disease, whether it's treat it, whether it's vaccinate for the rest of the

population, or whether it's to do management kinds of things that might alleviate the ongoing outbreak of the disease. So, that I did when I was at the Oregon State University diagnostic lab. That type of pathology was also, then, done when I was at the health lab.

In a forensic case, being "forensic" means "forum" and, so, it's -- all of your evidence is, then, subject to being reviewed by other pathologists, reviewed by the Court, so, you want to be able to look at your findings in a manner that you would be able to present them.

So, the documentation of the evidence, where it's been, how it's been handled is important; that's chain of custody issues. The documentation photographically with photos to show what you're trying to -- what you see that is obvious and can be used in court to show other people what you see; the proper documentation of the written report. Not only do you need to describe what is there, but you need to describe what was normal, and you need to be able to eliminate satisfactorily all of the other factors or other possible explanations of what you see and then be able to present this in a court of law in a manner in which it can be understood by the judge, or jury in many cases.

MR. FERNANDES: Your Honor, at this time the defendants offer Dr. Stroud as an expert witness on veterinary diagnostic pathology on cause of death issues and also on

forensic evaluation of biological evidence.

MR. BLACKBURN: No objection to the first offer. The offer on biological evidence and forensic evaluation --

MR. FERNANDES: The opinions are going to be limited to that which was disclosed in the expert report.

MR. BLACKBURN: No objection.

THE COURT: He's received, then, for those purposes. Thank you.

BY MR. FERNANDES:

Q Let's talk about your opinions in this case. First, let's start by talking about the first whooping crane that was found alive and later died during the winter of 2008, 2009. Let's look at Defendants' Exhibit 6.

And did you review this report in connection with forming your opinions in this case?

A Yes. I reviewed this report along with a number of other ones that were written.

Q And let's turn to page 27 of Defendants' Exhibit 6.

Now, was a necropsy performed on the crane that's being described here in Defendants' Exhibit 6?

A Yes. This is the crane that was examined by Dr. Nancy Thomas.

Q Does the first paragraph describe when and how the first crane that was necropsied was recovered?

A Yes. Basically, it was recovered alive on the first of

December and was being, as I understand, rushed to a possible veterinarian to help it.

Q Now, did Mr. Stehn report that the crane that he picked up on December 1, 2008, may have been the same crane that was injured during migration and had restricted foraging ability?

A That's what he has reported.

Q Now, let's look at the actual necropsy report relating to this crane. Let's go to Defendants' Exhibit 118, please.

Is Defendants' Exhibit 118 a copy of the necropsy report for the whooping crane that was recovered on December 1?

A Yes. This is the narrative of the necropsy report produced by Dr. Thomas.

Q And how long does it generally take to prepare a necropsy report?

A This is highly variable. It may depend anywhere from what condition the carcass is in to what various tests may one -- may have to be done to add information to that necropsy report to help interpret what would be the gross findings. One can do a preliminary report based on one's first impressions and observations. The actual physical examination may take anywhere from, you know, an hour to all day long, depending on the detail. But, then, to get back all of the various laboratory results and other information, it may take, in some cases, years.

Q Let's look at the top half of this report. It reflects,

does it not, that this report was prepared by Nancy Thomas?
A Yes, it does.
Q Do you know Dr. Thomas?
A I know Dr. Thomas very well.
Q Did you work with Dr. Thomas at the National Wildlife Health Center?
A Yes. She was one of the original gang of three and -- that we worked side by side in the necropsy room at the lab.
Q Is she a personal friend of yours?
A She's a personal friend. I've known her for, well, since 1980's, so -- we've gone camping together; we've gone fishing together, her and her husband and my wife and I. Yes, socially, we've known -- known Nancy.
Q Is Dr. Thomas one of the top pathologists that you work with in your career?
A I would say yes, particularly as it relates to wildlife pathology.
Q What are the components of a diagnostic necropsy report?
A The various components, again, it depends somewhat on what condition the carcass is in. But if you have a nice, fresh carcass that you're working with that has been submitted from the field, first, of course, there is -- one would read the history, so, get an idea of the history of what at least somebody may have observed in the field, but then there is the external gross examination. This is what you can see on the

body surfaces. You look at the eyes, the membranes, any external wounds, abnormalities.

The next step is to go to the internal examination. This is done by opening up the carcass. Usually a ventral midline incision is made, the skin is reflected back, the breast is removed -- the breastbone and the muscle tissue is removed to look at the internal organs, how they lie, what kind of pathologic entities you might see there.

The next is to remove various tissues. Some of these tissues are removed and put in formalin for a microscopic examination, which is the next kind of important segment of examination. This is where you are actually bringing your observations down into the cellular level. And, then, in addition to that, you are taking samples for culture for the microbiologist to culture. And these can be samples related to identification of bacteria present in the tissues, of viruses present in the tissues; and, then, parasitology.

Sometimes you collect the parasites individually, or grossly; sometimes what you do is they're in the tissues, and you give the tissues to the microbiologist and the parasitologist. They identify the various parasites that might be available. And, then, you also collect samples if there is a suspicion here of some type of a toxic insult, such as pesticide poisoning or lead poisoning. You collect the appropriate tissue to send to the chemist.

Once you get all of that together, all the results back, you kind of put it together to develop a picture of what's going on in this carcass, and you write a report.

Q Let's walk through this necropsy report. First let's start by looking at the external exam. Let's look at Defendants' Exhibit 118.

First of all, what is an external exam?

A That's just observing what you can see before you open up the carcass.

Q Now, can you please talk to us about the importance of the first two sentences that are highlighted under this external exam?

A There are actually a number of different things talked about here, but I think the most important thing here is, is, number one, the conjunctiva, that is, you know, the eyes, the whites of the eyes and that type of thing and the mucus membrane surfaces, are pale pink. This would to me indicate the bird may be anemic. The keel is severely prominent. The keel is the breast muscle attachment. It's the breastbone. And the keel in birds, prominent keel basically indicates that those breast muscles are atrophied, that is to say they have lost their mass, and that's why the keel protrudes.

Q Now, do you see there where it says the left hock is diffusely swollen and soft? Do you see that?

A Yes.

Q Let's talk a little bit about the left hock.

First, were photos taken in connection with this necropsy?

A Yes. There were photos taken of the hock.

Q And did you review those photos in forming your opinions in this case?

A Yes. I did.

Q Let's look at Defendants' Exhibit 118, NWHC 81.

Was this one of the photographs taken in connection with the external exam?

A Yes. It was.

Q And was this picture taken with the crane lying on its back?

A Yes.

Q So, if I'm looking at that screen, or if I'm looking at DX-118, this photograph, the knee on the right is actually the crane's left knee, correct?

A That's correct.

Q Let's talk about what a left hock is.

What is a left hock?

A Well, it's a joint in the legs. It is actually analogous to our ankle. And it is a, you know, part of the functional foot of the crane, the lower area. There are tendons that run through there as well as the actual joint, and that -- it is basically a very important aspect of how they walk and get

around.
Q And using your laser pointer, can you show us where the left hock appears in this photo?
A This is the -- this would be the left hock, or the --
Q And does this left hock appear swollen?
A If you compare it to the other one, which is more normal, yes, it is definitely swollen.
Q Now let's go back to the necropsy report. And do you see there where it says: "Left hock is diffusely swollen"?

Now can you kind of -- now that we've kind of seen the left hock, can you kind of take us through this necropsy report and explain to us the importance of what's being described up to where you see the 17 millimeter superficial laceration?
A Well, what Dr. Thomas has indicated there is that it's swollen and it's soft. In other words, there's probably some edema fluid in there which would make it soft and squishy. You know, if you have an abscess, it's kind of a painful, soft, squishy swelling.

She also notes that the skin scales are partially sloughing. And she does then take a, you know, a -- we'll see a little later on there is another photograph that shows us kind of a scabby-looking lesion, which is maybe the source of why this thing is swollen.
Q Now, do you see there where it talks about the 17-

millimeter superficial laceration? Let's look at the photo of the laceration, Defendants' Exhibit 118, NWHC 74.

A This is not showing up real well, but you can --

THE COURT: Please be careful of the microphone. You're hitting the microphone.

THE WITNESS: Oh.

THE COURT: Thank you.

THE WITNESS: I apologize for that. I'm sorry.

THE COURT: It's quite all right.

I mean, I can't say that --

THE WITNESS: Right --

THE COURT: -- Ms. Gano.

THE WITNESS: Right here, this doesn't --

MR. FERNANDES: Well, we have cautioned all of our witnesses.

THE WITNESS: Yeah. I just didn't even realize. I'm trying to stay away from it.

But this area right in here -- you can't see it very well from here; I can see it on the other monitors -- but there is a lesion there where the skin has been torn or lacerated.

BY MR. FERNANDES:

Q And, so, is this the laceration that is being described in the necropsy report?

A Yes.

Q Let's go back to the necropsy report.

Now, first, what is meant by "superficial laceration"?

A That generally is a reference to it's only skin deep. A laceration can, if there was underlying muscle, extend down into the muscular layers underneath the skin, but this one she describes as being superficial, meaning it's a -- just involves the skin.

Q Can you please explain the importance of the remaining highlighted sentence under that, under that section, "17-millimeter superficial laceration"?

A The muscle circumference over the -- just -- that would be just above this area that we've shown to be swollen and lacerated -- is -- she describes as being narrower than the other, more normal leg. This would suggest that the muscles that are attached to the tendons that go down into this and through this particular area have atrophied, or become smaller, because they're not being used.

This is supported by a further area down there where it says under "radiographic examination" that there is a fuzzy appearance in that left hock. Well, that basically tells me that the inflammation or -- that's going on here has penetrated down into the bone and you have bone degradation; you also have proliferation, which is indicative to me that this thing has been going on for some period of time.

Q Now let's look at the internal examination. Again, on DX 118, on Defendants' Exhibit 118; what is an internal examination?

A This is where you basically make an incision along the ventral area, peel the skin back, examine the surfaces of -- the internal surfaces of the subcutaneous tissues, the musculature, the bone structure, and then you go ahead and go further down into the carcass exposing the internal organs and pulling them out and examining each of the internal organs to see if there are indications or lesions of some disease process.

Q And were photographs taken of the internal exam?

A Unfortunately, there is no record either in the necropsy report or in -- that were supplied to us that any of the internal observations were photographed.

Q Well, let's look at 118.

Isn't that a photograph of the internal exam?

A Yeah; I was talking about the -- of the body. This is a what would be called an "internal photograph" of the lesion that was -- we had an external photograph of. This photograph is the hock area, the swollen hock, that has been skinned -- you can see where the skin was removed there and there -- to show the subcutaneous tissues. And what they are trying to demonstrate there is, is that there are areas there of what's called "hyperemia," which is a designation for, like, an active

infection, blood going to the area. Being "hyperemic" means that the body is trying to react to this. There is also some description there of a kind of a hole with necrotic tissue. And I don't know if you can see it very well, but it's right up in this area here.

Q Let's go to that side-by-side and bring back the necropsy report.

Please walk us through this internal exam up to the part discussing the interior of the joint.

A Okay. Well, as I just mentioned, the overall coloration, although you can't see it up there very well, is reddened, hyperemic. That means there's tissue reaction there. There is a large -- she describes as a large foci of green, tan necrotic material. And that's what was right in here. You can see it -- kind of see it, it's not real plain -- but that would indicate that there is an active, a necrotic process going on here. You know, green always suggests to me, okay, gangrene; something's going on there that's fairly significant. There is -- that's just on the outside. I believe the inside of the joint shows some further pathology.

Q Well, let's look at the photo of the interior of the joint.

A This is where the joint has been, basically, cut open and the two ends of the bones revealed. In this case, we have -- this would be the end of the one of the bones, probably the

tibial bone, and it's kind of got this dark haze to it, similar to here. It should look more like this area right here. That would be more the normal view of bone surfaces.

In addition to that, we have accumulations of necrotic material, fibrin, and that type of material indicates that there is an ongoing tissue reaction. She further describes --

THE COURT: I'm sorry; did you say that gangrene was green?

THE WITNESS: Yeah. There is a -- it's a discoloration. It literally isn't green, as you say --

THE COURT: I thought you said that.

THE WITNESS: -- but it's a discoloration.

THE COURT: Okay.

THE WITNESS: Yeah.

THE COURT: I thought when you said you saw green, you thought of gangrene.

THE WITNESS: Well, yeah. I mean, that's kind of one of those --

THE COURT: I didn't know gangrene was green.

THE WITNESS: -- mental notes to bring up gangrene. Gangrene is --

THE COURT: So, gangrene is -- you're saying, you're testifying, that gangrene is green?

THE WITNESS: No. I'm not testifying --

THE COURT: Okay. I misunderstood.

THE WITNESS: -- that gangrene is green. But greenish color, discolored tissue indicates that there's -- you know, there's a breakdown. Some bacteria, like proteus, oftentimes will give a green pus. It's actually a kind of a light green pus. And that's characteristic of certain kinds of abscesses. You see this in cats fairly frequently, abscesses that have kind of a greenish-tinged pus to them.

MR. FERNANDES: Let's go to --

THE WITNESS: Does that --

MR. FERNANDES: Oh.

THE WITNESS: -- answer your question, your Honor?

THE COURT: No, no. I was asking you --

THE WITNESS: Okay.

THE COURT: -- why you thought gangrene was green.

THE WITNESS: It's a mental note; "gangrene," okay.

THE COURT: Okay.

BY MR. FERNANDES:

Q Can you please walk us through this internal examination as it relates to the interior of the joint, to the extent that you haven't already done so in connection with looking at the previous photo?

A Okay. Dr. Thomas talks about tan, crumbly fibrinonecrotic -- fibrinonecrotic material, which -- this is some of that material right in here. And that's kind of packed

into the joint capsule, or the joint cavity there. That indicates that there is an infection in that joint and the body is reacting by trying to put fibrin in it. The necrosis is probably due to the fact that the bacteria is still causing damage and destruction of tissue. So, you get a combination of body tissue reaction, along with debris from the battle, so to speak, in there.

She also, I believe, talks about the Achilles tendon down just a little below, and you have the tendon sheath involved, so -- it's a whole -- that whole joint and the tendons that are associated that go through that joint are involved in this pathologic process.

Q Let's look at microscopic examination of the tissue.

What is the purpose of a microscopic examination of the tissue?

A That is to bring into context -- when you look at either normal tissue or you look at diseased tissue, what you're looking at is to try and define the cellular types in there so that you can determine whether or not -- whether you have -- you may see bacteria associated with it; you may see certain types of inflammatory cells that tell you things. You may see structure abnormalities. There's a number of different pathologic processes that you can define.

So, it's, basically, going down, looking at the tissues that are associated with the pathology so that you can

see it at a lower level, that is, a microscopic level. To do this, you have to take the tissue, you fix them in formalin, you slice them very thinly, and then you stain them with various stains.

Q Now, what is histopathology?

A That is the study of the histologic, or the microscopic structure of tissues.

Q What does this histopathology tell us?

A Well, there's a number of things that says, in looking at -- we see that we have -- first off, she talks about the brain. Well, there's things there in the brain which are somewhat inconsequence to what is really going on here. But she makes a description of what she sees. The lung; there's occasional microthrombi are present in a capillary bed. Well, this is kind of a key finding, because it basically says something about the end point of this bird, how it died, and this is an indication that there was a disseminated process kind of terminally.

In the liver, we have some finding there that shows that there are small oval brown globules. And she presumes, based on the staining characteristic, that that's hemoglobin. Well, hemoglobin is a pigment that resides in the red blood cells. It would suggest that there is some kind of a process going on here that destroys red blood cells, and the pigment is kind of salvaged in the liver, which is what she is observing

there. The Kupffer cells contained a golden brown pigment in this -- so, that -- that's what that kind of says.

The next one that I picked out that was -- that is more or less important also is from the spleen. Again, what we're talking about is further evidence of possible blood breakdown within the blood vascular system, similar kinds of pigment from -- that she saw in the liver.

THE COURT: What is all this supposed to tell me?

MR. FERNANDES: Uh --

THE COURT: That the bird died?

MR. FERNANDES: No.

BY MR. FERNANDES:

Q Does this describe an infectious process that has occurred for a period of time?

A That's exactly what it describes. It's -- the body has been reacting to this --

THE COURT: You can lead. That's okay.

THE WITNESS: -- for some period of time.

BY MR. FERNANDES:

Q Do you have an opinion about how long this infectious process has been going on?

A In my opinion, you get this kind of changes after several weeks, like, two weeks, I mean, where --

Q Let's go quickly to the microbiology exam, pages three and four.

What does this microbiology finding tell us?

A Well, these are the isolates that came from the joint, and what we have in this report, they finally report this on the 13th of March, and that's clostridial species. Clostridial is one of the anaerobic bacteria that they isolated from this. In addition to that, there is e. coli, which is a common fecal bacteria, which can be a wound contaminant. And there is enterococci, which is another one of the more common bacterial organisms which can invade wounds and become irritating to the area. There is clostridium found in the joint fluids, also in the joint tissues, and --

Q And, then, let's just go to the final diagnosis. Okay? Let's go to DX 118, page six.

Is this the final diagnosis for this crane?

A This is the final diagnosis that Dr. Thomas has put together, and these diagnoses are used, then, to feed into their database of -- that they can use to survey disease in wildlife.

Q And what is your --

THE COURT: Did he start off by telling me that the ultimate death was by a predator?

MR. FERNANDES: Not this one.

THE WITNESS: Not in this one.

THE COURT: Okay. Not this one. Okay. The other one. Got it.

BY MR. FERNANDES:

Q What is your opinion regarding the cause of death of this crane?

A If you look at it from a pathognomonic or pathogenic viewpoint, what you get is you get a laceration, that is, a wound. This, then, becomes septic; that is to say, it has been invaded by bacteria. You have occurring after that, due to the infection, you have a necrosis and proliferation and -- of the fibrin, which is the -- it affects the ability of the animal to use that joint properly, and, so, the animal becomes weakened, unable to get around and hunt normally. He then actually dies due to kind of a stress-induced terminal phenomena in which the toxins probably absorbed up from the area of infection in the leg distribute through the body. This can cause what's called intravascular coagulation. There has been some with that hemolysis. This is the pigment and that type of thing that one sees. There is indication this had been going on for a while.

Q Let me --

A And --

Q Let me try to put this in --

A And, finally --

THE COURT: Can I ask?

MR. FERNANDES: Sure.

THE COURT: It says in order of importance. It doesn't say one leads to another.

Is that how you're reading it?

THE WITNESS: That's how a pathologist should be reading it. And --

MR. FERNANDES: But you'll see when we get the crane --

THE COURT: Sorry; I just never heard of that.

MR. FERNANDES: Yeah. Yeah.

THE COURT: I've seen a lot of --

MR. FERNANDES: Yeah.

THE COURT: -- autopsy reports.

MR. FERNANDES: Yeah.

THE COURT: And they list causes of death in order of importance, but they don't lead from one to the other. And I was just curious if that's something unique to veterinary pathology.

THE WITNESS: It's -- many pathologists do things differently, depending on their training and what the purpose of it is, and these are, in her mind, I'm sure, the --

THE COURT: Sir, no, I don't want to go in her mind.

THE WITNESS: Yeah.

THE COURT: I just don't know if you're able to tell me what she was putting there.

THE WITNESS: Obviously, she's putting in there --

THE COURT: It just says: "In order of importance."

THE WITNESS: Yeah.

THE COURT: "Final diagnosis is in order of importance."

It doesn't say one leads to five. You can make that surmise, but I don't understand how you're doing that.

THE WITNESS: I'm doing it based on the narrative within the report.

MR. FERNANDES: That's why we took the time going through the report.

THE COURT: I understand that. But I guess I got off with the --

MR. FERNANDES: Yeah.

THE COURT: -- with somebody who sees green and thinks of gangrene. That is disturbing.

MR. FERNANDES: Yeah.

THE COURT: And it concerns me about his qualifications. I'll tell you that right now.

BY MR. FERNANDES:

Q Let's go to carcass number two.

Was a necropsy performed on Carcass Number Two?

A Yes.

Q Let's look at that necropsy report, Defendants' Exhibit 119.

Is Defendants' Exhibit 119 a copy of the necropsy report that was performed on the second crane?

A Yes.

Q Let's look at the top half of that necropsy report.

Was this necropsy report performed by Carol Mateyer?

A Yes. Dr. Mateyer.

Q Let's look at the external exam. Let's go to side-by-side.

Could you please walk us through the important parts of this external exam.

A Okay. Dr. Mateyer indicates that she sees pale oral mucosa and conjunctiva, just like in the last one. This is --

THE COURT: Is this the Fort Worth whooping crane?

MR. FERNANDES: No, no. This is the second crane that died --

THE COURT: Got it.

MR. FERNANDES: -- at Aransas during the winter of '08-'09.

THE COURT: Thank you.

THE WITNESS: She reports that the keel is prominent, just like the previous one. She reports that there is hemorrhage over the head and that there are puncture wounds in the skull and that at the base of the skull there is laxity of the skull and possible this appears to be a disarticulated -- between the base of the skull and the first cervical vertebrae.

BY MR. FERNANDES:

Q Let's look at the internal exam for this crane.

Could you please walk us through the important parts

of this internal exam.
A There is no fat available on this carcass. The pectoral muscles, which are the flight muscles, are atrophied. And the tissues are tacky, so that would suggest dehydration.
Q Let's look at the microscopic examination of the tissue.
Can you please discuss the important findings from the microscopic examination?
A There are -- in the liver there is this hemosiderin-like tissue or pigment, which would suggest that there is a breakdown of red blood cells going on in the body. In the bone marrow there is poor representation of red cell precursors. That basically says this bird is not producing red blood cells. The spleen has, again, moderate hemosiderosis, and, again, there is further inference there of the red blood cells being broken down in the blood vascular system. In the bursa -- and the bursa is a unique little -- in a young bird it's a very important organ in that that is kind of the progenitor area for the white blood cells and the red blood cells, which then are -- as the bird grows, the function takes over, is taken more over by the bone marrow. And there are -- then this bursa kind of shrinks away and there are changes in that. It is an important part of the immune system in a young bird.
Q Let's focus on the esophagus. In your opinion --
A Yeah; in the esophagus, she says that there are multiple abscesses associated with small bacteria. On the surface there

is a inflammation that has larger bacteria in the -- on the surface of the esophagus. The fact that, although the inflammatory cells are mostly like eosinophils, she didn't see any parasites in the particular samples that she looked at, in the slices of tissue she looked at. On the other hand, it's well known that the eosophinols are the inflammatory cell of choice that are associated with parasitic infections.

Q Dr. Stroud, let's focus on the esophagus.

In your opinion, what is the cause of the multifocal abscesses in the esophagus?

A Because of the fact that there are eosinophils, and because of the fact that later on we see parasites that were associated with it in the parasitology report, the -- what happens there is, is the parasite invades the surface of the esophagus leaving a situation where bacteria invade, and it is apparent that throughout this bird there are small -- there are indications of infection of bacteria, which would suggest that perhaps there's an immune -- or this animal does not have a fully competent defense mechanism against bacterial invasion, which would suggest that the immune system is compromised.

Q Would the multifocal abscesses in the esophagus, in your opinion, cause the crane to have difficulty eating?

A Yes. In my opinion, if you have a -- multiple abscesses in your esophagus, you may have a difficult time eating.

Q And are all of these findings consistent with a crane that

is having problems with its immune system?
A There are -- throughout this whole report there are indications, in my opinion, that suggest that this bird is immune compromised.
Q Let's go to microbiology real quickly, pages two and three.
What do these microbiology -- briefly -- what do these microbiology tests show us?
A Again, there is several different significant bacteria isolated from the tissues. These include e. coli, which is a common fecal contaminant and wound invader. In addition to that, there is salmonella in the lower G.I. tract. Salmonella is usually associated with bird feeder -- fecal contamination at bird feeders and causes diarrhea and a inflammation and scarring of the digestive tract. So, that organism is there. The liver has e. coli isolated from it. This would be suggestive of a septicemic involvement where the bacteria actually have gone into the blood system and then filtered out in the liver.
Q Let's go to the parasitology exam real quickly. And I want to focus on the esophagus again.
Would the large number of papules and pustules present throughout the esophagus cause the crane to have difficulty eating?
A Yes, it would.

Q In your opinion, what is the cause of the papules and pustules present throughout the esophagus?
A Initiated by parasite invasion with secondary bacterial infection.
Q Are all of these findings consistent with a crane that is having problems with its immune system?
A Yes, because he cannot fight adequately against the invading bacteria.

THE COURT: Just --

THE WITNESS: And --

THE COURT: Just to cut to the chase, aren't all -- can't you get immune system problems and infection problems secondary to an already-compromised body from emaciation or thirst?

THE WITNESS: That would not be what I see written --

THE COURT: I'm not asking what you see. I'm just saying: Isn't that something that can happen to a compromised body --

THE WITNESS: Yes.

THE COURT: -- that is not getting adequate food or water? You can get these infections and die.

THE WITNESS: Yes. Nutrition can be a factor in having --

THE COURT: A compromised immune system.

THE WITNESS: -- a compromised immune system.

BY MR. FERNANDES:

Q Let's go to the virology here.

What is infectious bursal disease virus?

A It is a virus that primarily has been identified in the poultry industry. It is a virus which attacks usually the younger individuals of the -- of various bird species. And it is a virus which can destroy the bursa and the progenitor cells which then are used by the body to develop its immune system and its defenses against the common bacterial and parasitic and viral insults that are out in the environment.

Q And is it commonly referred to as "IBDV" virus?

A That is correct.

Q And is very little known about IBDV in whooping cranes?

A That is correct at this point.

Q Let's go to final diagnosis for this crane.

Before we talk about the final diagnosis, was a summary case report prepared for this crane?

A Yes. It was.

Q Let's go to Defendants' Exhibit 418.

Have you reviewed this case report?

A Yes. This was a summary report put out on 2/27/09 by Dr. Mateyer.

Q Was this case report prepared before the parasitology results were completed?

A Yes, it was.

Q Do you see here in this report it says:

"Changes in the liver and bone marrow suggest a pattern of anemia that may have" -- "that we have not previously seen in birds"?

A That's what she says.

Q What is your understanding of what is meant by that?

A It is my understanding that this is --

THE COURT: Is your understanding anything other than what she says?

THE WITNESS: Pardon? I --

THE COURT: Is it anything other than what she says?

THE WITNESS: She says that the changes --

MR. FERNANDES: Now, let's -- I'll withdraw the question and move on.

THE COURT: I'm sorry. I know I'm being difficult with him, but I have never heard a scientist say when he saw something green that he thought of gangrene, on that joint back there. I can't quite move beyond it.

Now, you know for a fact that there is no correlation between the color green and gangrene.

THE WITNESS: I would disagree with that statement.

THE COURT: Okay.

THE WITNESS: There is a --

THE COURT: You think that there is a direct correlation between green and gangrene?

THE WITNESS: May I explain?

THE COURT: No; I just want to know: In your mind, as a scientist, is there a correlation between the color green and gangrene?

THE WITNESS: Have you ever seen --

THE COURT: I'm just saying --

THE WITNESS: Yes.

THE COURT: Okay. And you think of gangrene when you see green.

THE WITNESS: Greenish discoloration of the tissue --

THE COURT: That's --

THE WITNESS: -- is caused by the degradation of hemoglobin, just like in a bruise. It goes kind of from a greenish to a greenish-yellow before resolving. Clostridial organisms, which are common in gangrenous kinds of wound contamination --

THE COURT: You're talking about clostridium welchii.

THE WITNESS: They --

THE COURT: "Gas gangrene," for a layperson.

THE WITNESS: Yeah. They -- there are toxins that destroy red blood cells, releasing the hemoglobin, giving a bruising effect. The bruising effect then can have a greenish hue, just like -- just like a bruise would have. You've, obviously, been bruised; and you can see there's phases in there where it kind of goes from a discoloration, kind of a

reddish on down to a greenish and yellowish and -- as the pigment is reabsorbed from the tissue.

With that in mind, tissue discoloration can go -- have a greenish hue. And you may not -- it may not be a green hue as this, for instance, the green of the collar here, but it -- there is a transitional period which produces a number of different discolorations of the tissue.

BY MR. FERNANDES:

Q Let's go back to the summary report.

Can anemia be associated with starvation?

A It can; particularly certain types of anemia which are anemias associated with usually micronutrients, such as iron, B vitamins, that type.

Q Based on the entirety of this necropsy report, in your opinion, was the anemia of this crane caused by starvation?

A In my opinion, the starvation is not described in the report here as the primary cause, because she says that the changes in liver and bone marrow suggest a pattern of anemia that has not previously been seen in birds. There has -- you know, nutritional anemias have been seen in birds. But she says this is different. And, therefore, she connects it with the pathogenicity of the virus that was isolated and makes an inference there that, oh, that maybe they better look at this as perhaps a cause of the anemia.

Q Do the parasitology results show that the crane had

problems with its immune system?
A In my opinion, yes. The --
Q Do the --
A The parasitology and bacteriology reports.
Q Do the microscopic examination results show that the crane had problems with its immune system?
A In my opinion, yes.
Q If the crane had problems with its immune system, in your opinion, would the crane have had problems making red blood cells?
A Yes. There is also an associated virus that associates with IBD that is actually an anemia-causing kind of a virus that they have isolated from other -- from chickens that go through this.
Q In your opinion, does difficulty making red blood cells cause anemia?
I'm sorry if I just said that.
A Yes.
Q Okay. Now let's look at the final diagnosis on page five of the necropsy report.
Is this the final diagnosis for this crane?
A It's my understanding this is the one that was put down by Dr. Mateyer before some of the other results came in. Yes.
Q In your opinion, what was the cause of death of this crane?

A It was killed by a predator.
Q In your opinion, what was the cause of the crane's severe emaciation?
A In my opinion, it was related to the overall infections of parasites and bacteria that may be related back to the fact that this appears to be an immune-compromised bird, and the isolation of IBD suggests at least a mechanism which would result in immune comprising it.
Q In your opinion, did this crane become emaciated because of food shortages at the refuge?
A I don't believe there is any evidence here in this report that tells me that food shortages were involved here. As a matter of fact, it did have some remnant food in it, as mentioned by Dr. Mateyer.
Q In your opinion, in connection with the first crane that we talked about today, did that crane become emaciated because of food shortages at the refuge?
A In my opinion, no.
Q Let's talk about the partial carcass that was found.

Was the remainder of this carcass reported to have been observed in the mouth of an alligator?
A That was what was reported in some of the reports from the refuge.
Q Was a necropsy performed on the partial whooping crane carcass?

A No.
Q Have you attempted to determine the cause of death of that juvenile crane?
A No.
Q With only a wing available to examine, in your opinion, is it possible to formulate a forensically valid cause of death?
A No; because you cannot eliminate alternative potential causes of death.
Q Let's talk about the pile of feathers found during the winter of 2008-2009.

If you wanted to determine whether those feathers were from a crane that died during the winter of 2008-2009, is there a test that could be performed?
A An examination by a scientist with a specialty in what's called "tefonomy," which is the study of weathering of bones and feathers and that type of thing, perhaps could determine whether or not this -- these feathers had been exposed to the environment and weathered for a period of time exceeding what might be expected. There's -- I cannot do that, no.
Q Was a necropsy performed on the pile of feathers?
A No.
Q With only a pile of feathers and scattered bones, in your opinion, is it possible to formulate a forensically valid cause of death?
A No.

Q Do you understand that TAP is alleging that 19 additional cranes that were missing on aerial surveys died during the winter of 2008-2009?
A Yes. I realize that.
Q In your opinion, is it possible to formulate a forensically valid cause of death without a carcass?
A You cannot cause -- or you cannot determine a cause of death without a carcass and, you know, supporting -- and/or supporting information.
Q Does the National Wildlife Health Center have a response team?
A Yes, they do; or they always have had.
Q And what is the purpose of that response team?
A The response team -- we used to call it the Resource Health Management Team -- is a group of trained scientists that would go to various refuges that were having problems and would provide technical assistance in diagnosing the problem and investigating what might be happening if birds were dying.
Q To your knowledge, did anyone from the Aransas Refuge ever call the National Wildlife Health Center and ask that the response team assess the health of the cranes during the winter of 2008-2009?
A Not to my knowledge. It's not in any of the information that I read, at least.
Q If you would turn to 34. Whooping cranes died prior to

arriving at Aransas during the winter of 2008-2009, and, then, an additional 23 died during the winter of '08-'09.

Are there any disease conditions that you would have considered if you were asked to investigate possible causes of death?

A If I were looking at this as a population problem, having the fact that there were birds directly coming down the flyway through areas that there were other diseases reported during that time, I would be highly suspicious that something was going on and was being brought down in -- into the refuge.

Things that I would consider would be exposure to a toxin. We know that during that period of time peanut toxicosis was a problem in sandhill cranes, so there is a potential if there was whooping cranes that may have fed on that. There is a potential for bacterial diseases.

MR. BLACKBURN: Your Honor, I'm going to object. I mean, this is, I think, just pure speculation, in the sense that it's just things that might have been.

MR. FERNANDES: Well -- that's --

MR. BLACKBURN: There is no evidence that any of this happened.

MR. FERNANDES: Well, there is no evidence that 23 cranes -- I mean, the whole case is speculation.

THE COURT: Is it almost finished?

MR. FERNANDES: I am. I'm -- by the 10:00 o'clock

break I will be done.

THE COURT: It's 10:00 o'clock.

(Laughter)

MR. FERNANDES: Oh. If you'll give me three or four minutes; I'm wrapping up.

THE COURT: Okay.

BY MR. FERNANDES:

Q Has IBDV been found among sandhills in the flyway?

A I believe it has. Yes.

Q Do whooping cranes have salt glands?

A Yes.

THE COURT: Have what?

MR. FERNANDES: Salt glands.

THE COURT: Okay.

THE WITNESS: Yes.

BY MR. FERNANDES:

Q Have you personally seen the salt glands when performing necropsies on the whooping cranes?

A I have.

Q Do the necropsy reports that have been performed by Dr. Nancy Thomas specifically describe those salt glands?

A She mentioned salt glands in at least two of her reports.

Q Let's look quickly at Defendants' Exhibit 419, page two.

Does this necropsy report specifically reference the whooping crane salt glands?

A Yes.
Q Where are the salt glands located on the cranes?
A They are in a area just above the eye in -- they are in a lot of different species of birds, particularly birds that use a marine environment.
Q What is the purpose of salt glands?
A They remove excess salt from the body, salt that may be ingested with water, with food. It's an adaptive mechanism for the birds.
Q And are salt glands designed to handle increased salinity levels?
A I would assume that's what they are designed for or have capability of once activated, and they are activated as they are stressed with salt, at least in all of the studies that I've seen.

MR. FERNANDES: Your Honor, I pass the witness at this time.

THE COURT: Thank you.

We'll take our morning break.

We're off the record.

(A recess was taken from 10:02 a.m. to 10:20 a.m.; parties present)

THE MARSHAL: All rise.

THE COURT: Thank you. You may be seated.

All right. Sir, one more thing. You're not familiar

with the Veterinary Pathology Board Certification?

THE WITNESS: I am familiar with the Veterinary Board Certification process, yes.

THE COURT: And what is it?

THE WITNESS: It's an extensive study period of time in which the candidate prepares himself to take a written examination. Usually, I believe, there's four parts to it. They include gross pathology, immunopathology, pathology related to various species. The emphasis does develop over the years. I think back when I was eligible to take the boards there was -- a predominance of the emphasis was on laboratory animal medicine.

THE COURT: Okay.

Go ahead.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Good morning, Dr. Stroud.

A Good morning.

Q I'm Jim Blackburn. I represent The Aransas Project, and I have a few questions for you.

I'd like to turn to the white bird that was carried out of the marsh by Mr. Stehn. I believe that is referred to on the necropsies as Bird Number 22363, I believe the first bird that you discussed.

Are you with me?

A Yes. Bird Number One.
Q Okay. Now, would you agree with me that history and circumstance have a role in pathology?
A Yes. History was recorded. Whether it was proved to be the -- that was the bird that he was talking about and it was -- in his report or whether it was this one, that I don't know.
Q Well, but let's go into it. Let me ask that we pull up -- this would be, I think, on Defendants' Exhibit 6, page 27.

And this is -- and, basically, your attorney highlighted the upper part of this where it was some discussion about -- that there had been a bird that had been seen limping in Saskatchewan.

Do you recall that?
A I recall that. Yes.
Q And there was some question about whether or not this is the same bird, right?
A Yeah, there is some question. I can only go by what the history says.
Q Right. You don't know that this -- that the bird found in Aransas is the same bird or not.
A Right.
Q And, but what I wanted to point out was, would you agree with the statement on this report that no levels of food availability at Aransas contributed to the death of this bird?

A I don't know that.
Q Well, the report says it, doesn't it?
A The report says it, but that's his -- that's his observation of what he feels.
Q But isn't this part of the history that should be taken into account in understanding a cause of death?
A Yes.
Q Did you read that?
A I read it.
Q But you just rejected it out of hand.
A I don't know if it's true.
Q But you assume what you want out of the report to be true is true, right?
A I report it.
Q I'm sorry?
A I'm not sure what the question is. Would you please rephrase it or repeat it?
Q I did not hear you offering any concern about the accuracy of the report. Did you?
A When I read it, no.
Q When you testified just a few minutes ago.
A I assume that that observation that he made is what he saw or what he assumed or his opinion.
Q Now, weight of an adult bird; if we use the term -- I'm going to use the term "white bird" to mean non-juvenile.

How much does a white bird generally weigh in terms of grams; do you know?

A I believe that roughly they're in the area of six kilos.

Q Six thousand grams?

A Six thousand grams, thereabout.

Q You didn't know that at your deposition, did you?

A I don't recall.

Q Now, do you agree with me that the white bird that was found -- and we can go to the necropsy report on this bird, which would be in DX-118, and I believe it would -- will have the subscript of 046. And just hone in on this right under external, internal observations.

Do you see the weight of that bird?

A Four thousand four hundred and sixty-five grams.

Q So, assuming a normal adult bird weighs about 6,000 grams, this bird is, what, 25 percent light?

A Twenty-five percent light, I would say, yeah.

Q And going down to "internal," there is no fat, right?

A Yeah. There is no question it's emaciated. That's what "no fat" means.

Q But no question about emaciation at all.

A No. It's emaciated. That was an observation that Dr. Thomas made. I concur. It was emaciated.

Q And would you go to cause of death.

(Pause)

Just zero in.

And we've looked at this before, but emaciation is identified as a potential cause of death by the examining pathologist, correct?

A I believe that you're misinterpreting and using the wrong terminology. Emaciation is a pathologic finding. It is not a cause of death.

Q What does "diagnosis" mean?

A "Diagnosis" is a label placed on a disease process.

Q And the purpose of a necropsy is what?

A The purpose of a necropsy is to determine various pathologic processes that may be identified as a disease entity or a -- otherwise known as a diagnosis.

Q So, when a pathologist enters a diagnosis, it would be over cause of death?

A Not necessarily.

Q Now, with regard to this bird, do you recall what date that it was found on?

A I believe it was the first of December.

Q Right. And do you recall when the bird was seen in Saskatchewan?

A I don't recall. It was -- I don't recall what he -- what timeframe that was. It was preceding that sometime.

Q Wouldn't it be well as well before migration was -- it would be at the beginning of migration, wouldn't you think?

A I don't know.
Q And your testimony was that the leg injury was about a minimum of two weeks earlier, right?
A That's my testimony. Yes.
Q And there is a laceration that was identified on the joint. Is that correct?
A That's correct.
Q And the laceration is consistent with, for example, a claw from a predator, right?
A Could have been. Yeah. That would be one consideration.
Q So, predation could easily have caused that knee injury, correct?
A Could have. Yes. It could have.
Q And are you aware that about a third of the flock has arrived by mid-November at Aransas?
A I'm not necessarily aware of just how much or how many or what percent or any of that type of thing, but --
Q Well, in fact, you've never observed whooping cranes on the refuge, have you?
A I have.
Q You have.
A Yes.
Q Okay. Now, Bird Number Two, 22410.
Now, that was a juvenile, right?
A Yes, I believe it was.

Q And juveniles, speaking of -- do you have any idea how much juveniles weigh normally? By the time they get to Aransas, are they same as adults? Are they a third of adults? What are they?
A Usually birds are fairly -- fairly much grown to the size of the adults even though they are immature.
Q And, so, six thousand, more or less?
A More or less, yeah.
Q And if we could pull up Defendants' Exhibit 119 and look at the weight of this bird.

Now, the weight of this bird is what?

A It says thirty-five forty-five grams, I believe it is.
Q So, this bird is about half the weight, right?
A That weight is perhaps half the weight, but what you're not accounting for is, is part of the whole breast is missing because it's been scavenged or chewed off by a predator.
Q Fair enough.

So, no question, this bird died of predation.

A There is no question it died of predation. It has wounds very typical of a -- what my experience would say is a feline type predator; that is, one that would grab it by the head, which is typically the way --
Q Bobcat.
A -- bobcats would do. Yes.
Q There has been testimony that bobcats -- fairly serious

predator for whooping cranes.

Now, you also agree that severe emaciation was identified in the bird in the necropsy.

A Yes. This is a pathologic finding, observation by Dr. Mateyer.

Q Now, I'd like to turn to -- and I believe that this is going to be Defendants' Exhibit 119. If we can go to the comment section, and go to "internal," please.

Now, would you also agree that, in addition to being emaciated, this bird was extremely dehydrated?

A It says suggested dehydration because it was -- the tissues are tacky. Yes.

Q Now, if I could go to the top of that page, please. History and summary.

Now, did you read this history and summary?

A Yes.

Q Now, this is a bird that died in January, and this was a bird that had been observed to be resting for an abnormal length of time while its parents were feeding. You see that.

A Yes.

Q Now, is lethargic behavior suggestive of emaciation and starvation?

A Lethargic behavior can be suggestive of many things, including active disease process.

Q Do you see the adult male chased the juvenile whooping

crane for about 40 yards?
A I see that.
Q Do you have any understanding of how this may fit into territorial behavior, or is this beyond the area of your expertise?
A That would be beyond my area of expertise.
Q Now, would you agree that emaciation and -- well, emaciation would be certainly associated with food shortage.
A Emaciation is only -- or food shortage is only one of many potential causes of emaciation.
Q But you agree that's one that could certainly contribute to emaciation.
A Yes. The lack of food, i.e. starvation, could result in emaciation.
Q And to the extent that plaintiff's theory of the case has food shortage as part of its theory, both birds one and two have aspects of food shortage that have been suggested in the necropsies, correct?
A Both one and -- birds one and two have pathological processes associated with either injury or disease that could lead to the bird's inability to either capture food because it's crippled or to assimilate and process food because of certain disease processes.
Q So, you don't agree with me?
THE COURT: He doesn't.

MR. BLACKBURN: He doesn't.

THE COURT: He's not going to tell you that dehydration and lack of food source can contribute to compromising the host.

MR. BLACKBURN: Okay.

THE COURT: And lead to other disease. He's just not going to say it.

MR. BLACKBURN: White bird --

THE COURT: Is that right?

THE WITNESS: I am going on the evidence that was presented within the necropsy reports --

THE COURT: Is that a yes or a no?

THE WITNESS: I am not going to agree that -- please restate that. I --

THE COURT: That's all right. Move on.

THE WITNESS: -- want to get the --

THE COURT: Thank you.

BY MR. BLACKBURN:

Q White bird in the mouth of the alligator.

Now, that's the third bird, right?

A Right.

Q What was recovered was, what, a wing, I believe?

A That's what is mentioned in the reports.

Q Yeah; I presume no one reached into the alligator to get the remainder of the body, correct?

A Correct.
Q Now, are you aware that there is at least an issue in this case about a whooping -- of whooping cranes coming and drinking fresh water?
A I am aware that that is a concern. Yes.
Q Do you have any doubt that whooping cranes drink fresh water?
A I am sure they drink fresh water.
Q Okay.
A To what extent they're dependent on it, I don't know.
Q Now, do you have any question that the bird that was in the mouth of the alligator died from predation?
A Yes, I have a question as it relates to I don't know if the bird that was in the alligator's mouth was already dead and the alligator was a scavenger, versus was it a healthy bird which the alligator caught and consumed, or was it a weakened bird that the alligator caught and consumed.
Q And the wing was --
A So, I don't -- I don't know for --
Q Well, the evidence is that the wing was detached from the body, correct?
A That's correct.
Q And isn't it true when alligators grab a prey they shake it and can basically rend whatever the animal is apart?
A That's what I have been told. I have observed alligators

and crocodiles feeding in various other circumstances on, you know, television and, you know, that type of thing, and my observation there is they grab and pull something down under the water when they kill it and --

THE COURT: Are they scavengers? Do they eat dead -- do they go find dead animals to eat?

THE WITNESS: Yeah, they are -- an alligator will be a scavenger if it's placed in front of them. They eat dead meat, yes.

BY MR. BLACKBURN:

Q Did you -- you were not here for the testimony of Dr. Chavez when he was talking about seeing an alligator take a live blue heron, were you?

A No, but I understand that that does occur.

Q So, you don't question that it could occur.

A No. I don't question that.

Q And the pile of feathers. Do you question that that's even from this year? Or from -- I'm sorry -- from the year of 2008-2009; was that correct?

A Without an examination by somebody who looks at that kind of thing and is a specialist in it, I think that is a question that needs to be answered.

Q And did you make any look at the -- well, first of all, do you know where that bird was found?

A Which one?

Q The one -- the pile of feathers.
A I have no idea where it was found.
Q So, you don't know if it was deep into the marsh or if it was on the uplands. You're just saying it could have been around for a long time.
A Yes.
Q But did you make any effort to understand any aspect about the location of that bird death before you said it could have been from another year?
A My opinion of it could have been from another year is simply based on the fact that it's my understanding these were feathers and some bone fragments, which do last for a period of time in the environment, and in forensics we always want to be able to get at least some kind of an idea of when the animal was deceased, and that would be time of death.
Q Was there any examination of that pile of feathers?
A Not to my knowledge, other than it was identified as crane feathers by somebody, I believe.
Q Now, just a couple of things. Salt glands.

Are you familiar with the term "vestigial salt glands"?

A I am familiar with the term "vestigual" (for pronunciation).
Q And my question was --

THE COURT: The term what?

THE WITNESS: Vestigual (for pronunciation).

MR. BLACKBURN: But I was asking --

THE COURT: How is that spelled?

MR. BLACKBURN: V-E-S-T-I-G-I-A-L, I believe, your Honor. It's like vestiges. Vestigial.

THE COURT: No, I understand that, but he was saying "vestigual" (for pronunciation) --

THE WITNESS: Well --

THE COURT: -- and I hadn't heard that word.

MR. BLACKBURN: I'm sorry. I misunderstood your Honor's question.

THE WITNESS: I believe you used the term vestigual -- vestigual (for pronunciation) salt gland.

MR. BLACKBURN: Well, I mispronounced it, then.

THE WITNESS: Yeah.

MR. BLACKBURN: Sometimes my tongue doesn't quite work right.

BY MR. BLACKBURN:

Q "Vestigial." Does that word mean anything to you in the context of salt glands?

A It would be a term used to describe a nonfunctioning vestige of the past.

Q Yeah; something that's really no longer functioning.

A Yeah; nonfunctional.

Q Now, are you familiar with brogan cranes?

A I believe those are the cranes that are in, if I'm not mistaken, New Zealand, Australia, or someplace.
Q Australia, I believe.
A Yeah.
Q And are you familiar that they come from a desert environment?
A I was -- it was my understanding they were a salt marsh animal, but that could be. I don't know.
Q Maybe. I'm --
A I'm not a crane biologist.
Q I may be mistaken.

Are you familiar with the fact they have active salt glands?

A Many desert animals have active salt glands.
Q Have you seen what a crane looks like with active salt glands?
A I have seen a number of waterfowl which are inhibitors of salt marshes that have active salt glands.
Q And my question is specific to cranes.

Have you ever seen a crane with an active salt gland?

A My recollection is I have seen crane salt glands as a anatomical feature on the -- above the eyes of the crane. Yes.
Q Have you ever seen salt glands functioning on a live crane with the secretion coming down the crane, that is, that occurs with active salt glands?

A I have not seen close enough any live cranes. I have seen dead cranes.

THE COURT: I thought you said you'd been to see the whooping cranes in the refuge.

THE WITNESS: Yes; I have seen them at a distance of maybe 200 yards.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Have you ever --

THE COURT: One more question.

MR. BLACKBURN: Go ahead.

THE COURT: Do you know what alligators eat? Are you --

THE WITNESS: Everything that they can get a hold of their hands on -- or mouth on.

THE COURT: Okay. So, you say they are carrion? They don't eat -- that they eat dead food?

THE WITNESS: They will eat dead food; they will eat live food.

THE COURT: And where did you get that information?

THE WITNESS: Basically -- they eat dead food? That's what they feed them at alligator farms. They don't feed them live food.

THE COURT: But in the live -- in the wild, though. Do you --

THE WITNESS: In the wild? If it's protein, I'm sure that they probably --

THE COURT: Do you know this for a fact?

THE WITNESS: Yeah; I have not seen them eat dead food, but -- if that is your question.

THE COURT: Okay.

BY MR. BLACKBURN:

Q And final question. Dr. Mateyer --

THE COURT: No; I asked if you knew whether they ate dead food in the wild.

THE WITNESS: I can't give a reference that says they go around finding dead carcasses to eat. But many predator species --

THE COURT: Just --

THE WITNESS: -- eat dead food.

THE COURT: Just asking about alligators. Do you know?

THE WITNESS: I don't know.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Dr. Mateyer was the pathologist on Bird 22410, right?

A That's correct.

Q And you came up with a theory of immune compromise as the cause of death; is that right?

A The cause of death was stated as predation. That is the

cause of death.

Q But --

A The cause of emaciation is what I feel is -- based on her descriptions, the cause of the emaciated condition is traceable back to pathology that is demonstrated within her necropsy report as opposed to it just simply starved to death.

Q Dr. Mateyer never said that in her report, did she?

A That it starved.

Q She never said that immune -- a compromised immune system was the primary cause, right?

A She doesn't say that, but she says in her report by the inclusion for the pathologic lesions that this animal had a disease process going on, including micro abscesses up and down the esophagus, the bacterial infection of the intestines, the heavy parasitism from the parasitology report which came back in, and, basically, the unknown of how much influence the virus that was isolated might have, which she suggests needs further study to see if, indeed, that is the scenario. But the fact is, is there are disease processes going on that would inhibit this bird from either ingesting and/or assimilating nutrients, whether the nutrients are present in the environment for it to eat.

THE COURT: Same thing. He's never going to say that a lack of food source can compromise the host and give them infections.

MR. BLACKBURN: Thank you, your Honor. No more questions.

MR. FERNANDES: No further questions.

THE COURT: You may -- you're excused. Thank you.

(Witness stepped down)

MR. BLACKBURN: Wait; your Honor?

Are you going to call -- who is your next witness?

(Mr. Blackburn and Mr. Fernandes confer off the record)

MR. BLACKBURN: Your Honor, Dr. Slack will be cross examined by Mr. Kahn, and I was wondering if we could trade places so that he could have the microphone in case he needed to speak.

THE COURT: Sure.

MR. BLACKBURN: Thank you.

MR. FERNANDES: And it's 10:50 now, so it shouldn't be a problem, but this afternoon I would ask this Court, if at all possible -- Dr. Stroud has diabetes, and he's -- and Parkinson's, as well. If we could take breaks every hour 15 or so, it would be helpful.

THE COURT: I thought we just heard from Dr. Stroud.

MR. FERNANDES: No, Dr. Slack, who is called next.

THE COURT: Okay.

MR. FERNANDES: If at all possible --

THE COURT: Absolutely.

MR. FERNANDES: -- that would be helpful.

Thank you, your Honor.

THE COURT: Is he insulin-dependent? Does he need a food source up here? Or --

MR. FERNANDES: Dr. Slack?

DR. SLACK: I think I can manage.

THE COURT: Okay. Well, you're welcome to have crackers or something if you need them.

MR. FERNANDES: That's what we usually do in the office.

(Pause)

R. DOUGLAS SLACK, DEFENDANTS' WITNESS, SWORN

(Pause)

DIRECT EXAMINATION

BY MR. FERNANDES:

Q Please introduce yourself to the Court.

A I am R. Douglas Slack.

Q Dr. Slack, have you ever testified as an expert in court before?

A No.

Q Let me show you what's been marked as Defendants' Exhibit 370.

Is Defendants' Exhibit 370 your C.V.?

A Yes, it is.

Q And is your educational background correctly set forth on this C.V.?

A Yes, it is.
Q And do you have a bachelor's of science in biology?
A Yes.
Q And a master degree and a Ph.D. in zoology?
A Yes.
Q Let's talk about your academic and administrative experience.

From 1990 to 2005, were you the Associate Department Head of Undergraduate Affairs in the Department of Wildlife and Fisheries Sciences at Texas A&M University?
A Yes.
Q And what did you do in that position?
A As Associate Department Head for Undergraduate Affairs, I was responsible for the undergraduate curriculum for perhaps the second-largest program in the United States, wildlife and fisheries program.
Q Between 2005 and 2011 -- actually, August 31st of 2011 -- were you the Regent's Professor and Associate Department Head for Undergraduate Affairs?
A Yes.
Q What does "regent professor" mean?
A Regent's professor designation is given to faculty members that have distinguished themselves in university service, as well as to the people of Texas.
Q Did you recently retire from teaching at Texas A&M?

A Yes, I did, and everything else, too. So --
Q Do you still have the title of Regent's Professor?
A Yes, I am Regent's Professor Emeritus.
Q Are you currently the executive director for the Texas chapter of the Wildlife Society?
A Yes, I am.
Q What is the Wildlife Society?
A Wildlife Society is a professional -- international professional organization of approximately 11,000 individuals.

THE COURT: How many? I'm sorry.

THE WITNESS: Eleven thousand individuals.

These are professional state and federal biologists, university biologists, private consultants, and the like.

BY MR. FERNANDES:

Q And what are your duties as the executive director?
A I represent the Wildlife Society membership in Texas, in conservation -- with other conservation organizations, and with the legislature and the executive branch of the Texas state government.
Q So, do you meet with the legislature on behalf of -- in a representative capacity -- on behalf of the Wildlife Society?
A I do.
Q Okay. And what are some of the issues that the Wildlife Society -- some of the current issues that you've been working with the legislature on?

A Well, the Wildlife Society is interested in the conservation of wildlife species in Texas, and the wildlife species that seems to be under most concern about management and conservation are deer farming in the state of Texas and managed deer permits. So, I have worked with the legislature regarding that in the last legislative session.

Q Let's go on. Were you a captain in the U.S. Army?

A Yes, I was.

Q And was that between 1967 and 1969?

A Yes, and during that three-year period I spent one of those years in Viet Nam.

Q Let's talk briefly about some of your honors and awards. Let's turn to page 38 and 39.

Have you received numerous outstanding professor awards during your long career?

A Yes, I have.

Q At Texas A&M are there different levels; department, college, and university?

A Yes. And each of those levels gives awards. Right.

Q And were some of the awards that are listed on this page given to you at the college or university level as opposed to your department?

A Yes. There are at least four on that page, including the very last one I received, which is given at the university level.

Q Let's talk briefly about your professional activities. Please turn to page 39.

Did you chair the black-capped vireo recovery team?

A Yes, I did.

Q Is the black-capped vireo an endangered species?

A Yes, it is.

Q Who --

THE COURT: Is that the one you were talking about -- were you here -- have you been here the whole case?

THE WITNESS: Not quite. I --

THE COURT: Maybe that was another kind of vireo. Were they talking about a vireo around San Marcos?

THE WITNESS: Yes.

THE COURT: That is the one we're talking about?

THE WITNESS: Uh-huh. Uh-huh.

THE COURT: That's really important in that area around San Marcos, and the springs, and what have you?

THE WITNESS: The Hill Country; the black-capped vireo is found throughout many parts of Texas.

THE COURT: Thank you.

BY MR. FERNANDES:

Q Who invited you to join the black-capped vireo recovery team?

A U.S. Fish and Wildlife Service.

Q Did you serve on the board of directors of Audubon Texas

from 2000 to 2006?
A I believe those are the correct dates, and, yes, I was.
Q Are you a member of Audubon Society today?
A Yes. I am a member of National Audubon Society, Travis Audubon Society.
Q Were you one of the founders of the Audubon Society in College Station?
A Yes. I helped found -- co-found the Rio Brazos Audubon Society.
Q Were you the president of the southwest section of the Wildlife Society from 1996 to 1997?
A Yes.
Q Did you chair the Endangered Species Act technical review committee for the Wildlife Society?
A Yes, I did.
Q And what did you do in that position?
A At that time there was significant political concerns about the Endangered Species Act, and things were moving quite dramatically. And, so, that committee served to primarily provide guidance and advise the executive council of the Wildlife Society in Washington.
Q Between 1988 and 1990, did you serve on the board of directors of Colonial Waterbird Society?
A Yes, I did.
Q What is the Colonial Waterbird Society?

A Colonial Waterbird Society is a professional society of ornithologists that study birds that are found in colonies, everything from martins to egrets and herons.
Q Have you been a certified wildlife biologist since 1980?
A Yes, I have.
Q Let's look at page 41.
Does this accurately reflect your current memberships?
A Yes, it does.
Q Are you on the Audubon Austin, though, today? Is that how you remember?
A Yes, I am, but these are professional societies, and I differentiate conservation groups with -- from membership in these professional organizations.
Q Let's turn to page 21, your publications.
And what we're going to focus on is your publications that specifically relate to the whooping cranes. Are you with me?
A Yes.
Q Haven't you co-authored numerous publications concerning whooping cranes?
A Yes, I have.
Q And aren't a number of those publications peer reviewed?
A Yes.
Q And what is a peer-reviewed publication?

A Peer-reviewed publication is one in which the author or authors send the manuscript to an editor of a journal and the editor then sends it out for review by peers, and the peer-review process is used to determine whether or not the article will be published.

Q Let's talk about your peer-reviewed publications concerning the whooping cranes, page 43.

A Uh-huh.

Q Are all four of these highlighted papers peer-reviewed?

A Yes, they are.

Q Now, the first paper I see you wrote with Dr. Chavez-Ramirez. Is that TAP'S expert in this case?

A That's right.

Q Was he one of your students?

A Yes, he was.

Q You've had a number of students that have written their dissertation on the whooping crane.

Where was Dr. Chavez-Ramirez on your list of students?

A He's right up there. Yes, he's very good.

Q Was he number two or three in terms of the students that wrote dissertations on the whooping crane?

A Well, he --

THE COURT: Do you mean in time or in quality?

(Laughter)

MR. FERNANDES: We're going to say in time. I'm not going to get in trouble --

THE WITNESS: No, I don't want to get in trouble either.

(Laughter)

No, he -- he got his master's and his Ph.D. from me, so I got to know him quite well.

BY MR. FERNANDES:

Q Still a friend of yours even though you're sitting on opposite sides today?

A Yes.

Q Now, briefly, what was the subject of the paper that you co-authored with Dr. Chavez-Ramirez in 1999?

A That was a paper that documented from peer-reviewed literature the fact that -- the differential territorial behavior and group behavior that birds participate in at the Aransas Refuge. So, it was about these movements on the refuge, as well as the differential social structure.

Q Now, under that, there appears a couple of peer-reviewed articles that you wrote with your student, Mr. Hunt. Was that Howard Hunt?

A Uh --

Q I'm sorry; Nelson.

A Nelson. Right. Yes.

Q Yeah.

A Yes.
Q What was the subject of the 1997 paper that you wrote with Nelson and Gee?
A Jay Nelson worked on the whooping crane nutrition, and he worked at -- had been a employee at Patuxent National Wildlife Refuge. And to do studies about digestibility and nutrition of crane foods, we had to form the foods into pellets. It turns out that cranes would not eat real food at Patuxent. So, when you handed them a snail or a clam or a crab, they wouldn't eat it, so we had to put it in the form of what looked like dog food, and, but it would crab dog food or clam dog food, and see how they would eat it and how digestible it was for them. That was the 1997 paper.
Q What about the 1996 paper? What was the subject of that?
A The 1996 paper was the nutritional value, the different kinds of foods that cranes utilize at the Aransas Refuge.
Q And, then, I noticed the last paper was authored by Dr. Chavez-Ramirez, Mr. Hunt, you, and Mr. Stehn.
A That's correct.
Q And what was the subject matter of this paper?
A Well, it -- Howard Hunt and Dr. Chavez-Ramirez worked on the behavior of cranes in different parts of the refuge. Howard Hunt's dissertation was primarily focused on the movements of cranes into the uplands as a result of fire treated -- fire treatment in the uplands.

Q Let's look at -- turn to page 44.

Now, there are a number of articles here that you've authored or co-authored involving the whooping cranes, but let's focus on the 1989 paper that was peer-reviewed.

A Yes.

Q What was the subject of that paper?

A It was a paper but that is also part of Howard Hunt's dissertation research in which he looked at fecal analysis of cranes and dug into the feces of cranes and separated different food items from one another and developed an analysis of what cranes eat based on feces.

Q Now, I know that you've retired and moved to Austin, so have you just -- are you doing anything today in connection with studying the whooping cranes?

A Yes. We are still working on manuscripts on cranes. I just discovered last week, 10 days ago, that we have had another paper accepted for publication in a journal, in a peer-reviewed journal.

Q And what is the subject of that paper?

A It's a demography and population trends of whooping cranes.

Q And could you go on further?

A Yes; and we looked at -- we modeled based on 12 cohorts of marked birds from the mid-1970's to the mid-1980's when the birds were being color banded. We took those color-banded

birds, and at one time that made up 50-some percent of the flock was color-banded, which is an incredible thing. And we then marked -- looked at those cohorts as they fell out of the population with time; and, based on that, we're able to construct demographic trends in the population.

Q And is there a global warming aspect of that study?

A Yes, there is. We have come to the conclusion in that study that the recovery plan targets for delisting, down-listing of the cranes, for a population of cranes, it doesn't have two self-sustaining populations, there will need to be approximately 1,000 whooping cranes at Aransas National Wildlife Refuge. The target from the recovery plan was that that would be reached in 2035. Our data analysis suggests that it won't be reached until closer to 2060.

Q Why is that?

A Well, as the birds -- as the population grows, it's going to need more and more space of a good salt-marsh habitat, and we look at the available salt-marsh habitat. With the losses that are occurring in that habitat, even through the 404 permit process, there will not be -- it will just -- it's going to take longer than we imagined, plus we're concerned about climate change. At the same time we lose habitat for the cranes, climate change is going to cause a sea level rise, and that's going to take habitat from the cranes.

MR. KAHNE: Your Honor? I don't think we've seen

this paper that he's referring to.

MR. FERNANDES: It's in -- it was in manuscript form, and I didn't know it until I was talking to --

MR. KAHNE: Well, manuscripts, nonetheless, exist. Could we have a copy --

MR. FERNANDES: Absolutely.

MR. KAHNE: -- at the break?

MR. FERNANDES: Absolutely.

MR. KAHNE: Thank you.

MR. FERNANDES: Absolutely. We apologize.

BY MR. FERNANDES:

Q Let's look at page 46.

A Uh-huh.

Q This contract report; under the heading, "Contract report," does this refer to the study that's commonly referred to as "SAGES"?

A Yes, it does.

Q And what was your role in the SAGES study?

A I was one of three co-principal investigators. Myself, Dr. Grant, and Dr. Davis were co-principal investigators. In that study, the primary objective was to use empirical derived evidence to investigate the link between freshwater inflows and marsh community dynamics in San Antonio Bay and in relation to whooping cranes.

Q Now, did that study involve many of the issues that are

the subject of this dispute?
A Yes.
Q Let's go back really quickly to page 57.
THE COURT: Can I -- would it be any kind of habitat recovery plan for our -- the Aransas area --
THE WITNESS: Uh-huh.
THE COURT: -- would have to include climate change?
THE WITNESS: Yes, ma'am.
THE COURT: Thank you.
THE WITNESS: Yes, your Honor.
BY MR. FERNANDES:
Q Let's look at page 57.
A Uh-huh.
THE COURT: And any long-term plan to preserve the whooping cranes would have to include climate change.
THE WITNESS: Yes.
THE COURT: Thank you.
BY MR. FERNANDES:
Q Were you the speaker of the Texas A&M University faculty senate?
A Yes, I was.
THE COURT: The what? I'm sorry. Oh, got it. Never mind.
//
//

BY MR. FERNANDES:

Q What does that mean?

A The faculty senate is an organization elected by faculty members, about 90 individuals, that merely are responsible for faculty governance in academic matters on the Texas A&M University campus.

Q And did you chair the presidential search committee for Texas A&M when it was tasked with finding a replacement for Dr. Robert Gates?

A Yes, I did.

Q Let’s talk about your students.

A Let’s talk about what?

Q Your students.

A Okay.

Q I’m doing better with “carcass” today and I’m hoping I’m not losing you with “students.”

A Okay.

Q I’ve had prodding from my co-counsel.

Let’s talk about your students. Let’s look at Defendants' Exhibit 423.

Now, does Defendants' Exhibit 423 list all of your students who wrote their dissertations or theses on endangered species?

A Yes; on non-whooping cranes.

Q Let’s look at Defendants' Exhibit 423.

Are these all of your students, graduate students, who have written dissertations or theses specifically relating to whooping cranes?

A Yes.

Q Have you read Robert Porter Allen's book on whooping cranes from 1952?

A Yes, I have.

Q From your perspective, what were Robert Porter Allen's most important contributions to the whooping cranes?

A Robert Porter Allen is kind of my hero. He was an old-time wildlife biologist, naturalist, who studied a bird or birds. He also wrote a monograph on roseate spoonbills along the Texas and Gulf Coast. But he, in terms of whooping cranes, lived with the cranes, so to speak, and he, before we even knew where they bred, he was in the business of finding out about this wintering flock and -- at the current Aransas National Wildlife Refuge. And he described all kinds of -- he described their behavior; he described what they ate; he described their movements. It was groundbreaking work that all of us today that work on whooping cranes cite.

THE COURT: It's that beautiful little book that you all put in evidence?

MR. FERNANDES: Yes.

THE COURT: Right.

MR. FERNANDES: That Mr. Mundy is --

MR. MUNDY: They do have a replacement now.

MR. FERNANDES: -- sort of, "Give me mine back." Now you understand why he's -- reserved his --

(Laughter)

MR. MUNDY: We do have replacements.

BY MR. FERNANDES:

Q Since Mr. Allen's book in 1952, has anyone authored more peer-reviewed publications on the habitat, behavior, and foraging ecology of the whooping cranes on the wintering grounds in Aransas than you?

A Than me and my students.

Q Since your first student went to Aransas in the early eighties, aren't all of the peer-reviewed articles that concern the whooping crane habitat, behavior, and foraging ecology written by you and your students?

A Yes.

Q During the past 38 years, has a significant portion of your life been dedicated to the conservation and management of endangered species?

A Yes. Yes, it has.

Q Do you consider yourself and environmentalist and a conservationist?

A I get called a lot of things. I have -- I am many things. I am conservationist, and in the Teddy Roosevelt sense of the term, the wise use of natural resources. I certainly -- I do

that; and a conservationist that uses science to make decisions about wildlife and plant resources.

I certainly am an environmentalist, I think, in terms of defining it, about living in a quality environment; and I don't know anyone personally -- I have never met anyone personally that doesn't want to live in a quality environment. So, sometimes I am an environmentalist, but I am always a professional in -- that uses science to make decisions or help policymakers and decision-makers to make decisions about wildlife resources. And I am also a birder. And I -- so, it depends on what I'm doing, what I'm called and what I am, but I certainly am professional in everything that I try to do.

Q When I look at that list from 1984 to 2010, I'm reminded of a movie that was called Mr. Holland's Opus.

Have you ever seen that movie?

A No, I haven't.

Q Oh, because that --

THE COURT: I have. That's what counts, right?

MR. FERNANDES: Yeah. That looks like your opus up there.

(Laughter)

BY MR. FERNANDES:

Q Now, there are -- your Honor, at this time --

THE COURT: Do you chair the committee for each of these dissertations?

THE WITNESS: Yes.

THE COURT: Okay. Thank you.

BY MR. FERNANDES:

Q In fact, some of the other articles that we had up there, you weren't the chair of, were you not? There are a number -- for example, there are a number of students you've worked with that have worked on endangered species as well that you haven't chaired that we haven't shown, correct?

A Yes. Part of the SAGES project. That's correct.

MR. FERNANDES: Your Honor, at this time defendants offer Dr. Slack as an expert on whooping crane biology and conservation.

MR. KAHNE: No objection.

THE COURT: You're accepted as that. Thank you.

THE WITNESS: Thank you.

BY MR. FERNANDES:

Q When is the first time that you visited the Aransas Refuge?

THE COURT: Do you have water?

Does he have water up there?

THE WITNESS: That would be good. Thank you.

(Pause)

I can see how you can touch this microphone.

THE COURT: It makes a mess, doesn't it? It really makes a noise.

THE WITNESS: Thank you a lot.

THE COURT: So, the first time you visited the wildlife refuge.

THE WITNESS: The Aransas Refuge.

THE COURT: Yes, sir.

THE WITNESS: I visited it when I came to Texas in 1973. Wow. And I -- in the fall of 1973, I started as a professor at Texas A&M and I brought my family to Goose Island State Park to camp. And we went to the Aransas Refuge and went up in the view -- the old viewing tower and saw birds, and I took a boat ride from Rockport out to Aransas and was overwhelmed by these majestic birds, and I got to see my first wild turkeys, and, so, it was a spectacular thing for my family.

BY MR. FERNANDES:

Q How many whooping cranes were in Aransas in 1973?

A Fifty-five, 56; something like that.

Q And have your graduate students been doing field work at Aransas beginning in early 1981 with Ms. Bishop all the way to 2010 with Ms. Greer?

A That's correct.

Q Approximately how much time have you personally spent at the refuge during that period of time?

A Well, I worked in the metroplex of Bryan/College Station, and I had to teach during the winters and carry a faculty,

professorial load, so I didn't get to spend as much time as Dr. Chavez-Ramirez did in the field, but for each of my field graduate students, I would spent two to three trips a winter, depending on what stage that they were in, and Nelson was not a field student, but, some of the others were.

Q Did the students who worked in the field each spend at least two winters at the Aransas Refuge?

A Yes. Those that worked in the field spent two winters in Aransas, at least.

Q Now let's get to your opinions in this case.

Did you study the winter whooping crane diet with your graduate student, Howard Hunt?

A Yes.

Q And approximately when did those field studies begin?

A I believe he started his field trials in 19 -- in the spring of 1983 and one '83-'84 winter and '84-'85 winter.

Q And what was the focus of that study?

A Well, there were two foci. One was to evaluate movements in the uplands due to grazing and burning, but two, the focus, I think, of your question, we looked at -- we looked at food in the uplands also. He collected food from -- he collected feces in the upland and from those feces developed a database that would relate what those individual pieces of fragments in the feces were from, and then, from that, developed his analysis of food habits.

Q Let's look at Defendants' Exhibit 378.

Is Defendants' Exhibit 378 a publication that you and Mr. Hunt published in the Journal of Wildlife Management?

A That's correct.

Q Did this study -- did this publication report the results of your study on the whooping crane diet?

A Yes, it did.

Q Let's turn to page three.

Are the items on the left the various food items that was observed in the whooping crane feces?

A Yes.

Q And what is meant when it talks about "volume" on the right-hand columns?

A You mean in each one of the columns by time of year? Is that what you mean? Oh, I guess I've got a bigger one right here.

Q Yes, sir.

A Percent volume. We believe that the percentage of food fragments in the fecal mass was a good indicator of the importance of a food item, and a whooping crane feces is roughly that long and just about that --

Q Please watch the mike.

A I'm not touching it.

About that long, about -- what's that; six -- four to five, six inches long, about that diameter, and partially

covered in uric acid, making it white. And we would take these and sample those feces and, then, under a scope, sort the fragments into piles and come up with a percent volume of clam or crab or acorn, and, interestingly enough, crayfish, which is -- don't think it's on there.

Q Let's look at that pie chart.

Does this represent the food diet of the whooping crane during the two years of your study?

A Yes. This is, right, the data from Howard Hunt's study. That's correct.

Q Were blue crabs an important food item during those two winters?

A Yes, they were.

Q Were wolfberries an important food item during those two winters?

A It was in the second winter significant, but not as much in the first winter.

Q Were clams an important food item during those two winters?

A Yes. Very much so.

Q Were snails and insects important food items during those two winters?

A Yes.

THE COURT: What is the color for clams?

THE WITNESS: Green.

THE COURT: Okay. The green. All right.

THE WITNESS: Right.

THE COURT: Thank you.

BY MR. FERNANDES:

Q What did you learn from these studies?

A Well, I learned an important lesson, and I've learned it on beyond. And that is that I tell my students when they start their research, get to know the refuge biologist, get to know the refuge manager, because you can learn an incredible amount from those people. And all of my students did that. Howard Hunt went to the biologist and learned from him, went to the Audubon biologist at Rockport at that time and learned from him about cranes' behavior and food and all of that.

I learned from this that there is a variety in whooping crane food. We kind of started off with Howard Hunt thinking that all cranes eat were crabs and wolfberries; because that's what he was told and I was told and the like. Well, we found that they eat more than that. And, indeed -- indeed -- well, yeah.

Q Who funded this study?

A It was funded by Fish and Wildlife Service.

Q And you said that you were told that all they eat is blue crabs and wolfberries. Who told you that before you performed this study?

A The refuge biologist.

Q And who was that?
A I believe it was Tom Stehn.
Q Now --
A And the Audubon biologist also told us: Well, we already know what they eat; they eat crabs and wolfberries.
Q Now, did Mr. Hunt begin to study the whooping crane diet prior to the winter of 1983-1984?
A Yes, he did. We had to find out if we could do this volumetric analysis of feces; could we relate pieces of fragments in the feces to actual organisms. And, so, we -- he went in the field in February of 1983, which is many months before his first winter season, and he did a -- he captured -- he captured -- he collected feces in the field and brought those back to Texas A&M, where he worried about them all winter -- or all summer. And he discovered that in that time period, in the uplands, the birds' food was dominated by crayfish. And we thought we had an amazing find, because no one else talked very much about crayfish, and hardly ever since have people found crayfish in the diet of cranes. But in that one test year we found a lot.

So, I learned that cranes eat a lot of things, and this was the beginning of that evolutionary thinking.

Q Now, why didn't you present the findings from 1983-1984 study and your 1984-1985 study -- why didn't you present them on a monthly basis as opposed to an annual basis?

A Well, if you -- can we go back to that last -- the table? That last --

Q I think --

A That one right there. You can see the data are presented early winter, mid winter, and late winter. And those are two-month increments. We did break them out. Mr. Hunt came to me, much chagrined, that he broke them out by month, but crabs didn't turn out to be very important in all of the months. And we were told by the people that know cranes that crabs are it, all of the time. And, so, I told him, I said, "Well, what if we lump them together into two-month increments, November-December, January-February?" And it turned out that it confirmed what we had heard, which is not good. I mean, this -- that's not what we ought to be doing in science. So, we did it, because it made us feel more comfortable; but this also shows the variety over those months, too, so --

Q Let's go back to the pie chart.

So, if I understand what you said, you had a concern that if you broke this out by month, on a monthly basis instead of on an annual basis, on a monthly basis the percentage of blue crabs you thought wasn't high enough to support everything that you had heard about what the cranes eat.

A That's correct. That is correct.

Q Did Mr. Hunt -- did this study also include research on the burning and grazing and their effect on the whooping

cranes?
A That was actually the primary impetus of the study, was the effect on crane behavior of burning and grazing. And that related to why we got the money to do the research. There is -- there was then, and there is now, by me at least -- concern about British Petroleum-like spills in or around the Gulf intercoastal waterways that traverses the Aransas refuge. If that should happen when the cranes are there, is there a way to get them to the uplands, and what do they eat when they go there, and do they -- and there was a hint they responded to burns that had been going on. So, we put together a research design that had pastures that were burned, pastures that were grazed, as ways to manage the pastures to make land more available to whooping cranes.
Q And was that -- was one of the purposes of the study, to the extent that you had an environmental incident in the bay, to induce the cranes to leave those contaminated areas?
A That is correct. And, in fact, we know that occurs. If you burn the refuge, it's like putting up a "open" sign in a restaurant; people will, hopefully come. When they burn the uplands and knock back the running live oak, the cranes come and will appear in -- as small flocks of birds, so territorial birds will leave their territories, fly with the chicks to the uplands where there is burning just occurred, and forage on roasted burned acorns, forage on crayfish, forage on snakes,

forage on all kinds of things in the uplands.

Q As a result of this study, is the Fish and Wildlife Service doing prescribed burns today?

A They were doing prescribed burns, but it wasn't the same priority that they have now. The National Wildlife Refuge now has a burn crew, and they burn in a very rigorous way the uplands to keep the brush down, make food available for cranes, and preserve the uplands as kind of a prairie area. But they -- it's very intense now. That's correct.

Q Were there any ramifications to your recommendation that the uplands be burned to induce the cranes to go to the uplands?

A Yes. An interesting phenomenon occurred. We also had -- part of the study design was the effects of grazing, cattle grazing, on the uplands. And I -- we had a -- well, not "we." The National Wildlife Refuge leased part of the land for grazing with a lessee, and we studied the effects of grazing on crane behavior. And after all said and done, we recommended, as part of Howard Hunt's dissertation research, we recommended that grazing was not necessary; one can do all of the habitat modification with burning.

And the ramification was that the refuge manager, Mr. Brent Giezentanner, turned out to make one of the most courageous decisions I have ever seen. He said, "No more grazing on National Wildlife Refuge land." And both he was

hassled and I was, because it was like we were a threat to the cattle industry in the state, and so --

THE COURT: Like you were sheep.

THE WITNESS: Pardon?

THE COURT: Like you were sheep from the 19th century.

THE WITNESS: That's right.

(Laughter)

So, anyway, they removed cattle from the refuge. They removed cattle from parts of the Matagorda Island that had been made part of the National Wildlife Refuge. And, so, that was one of the ramifications.

BY MR. FERNANDES:

Q Let's look at -- let's go back to Slide Number 2.

A Uh-huh.

Q And we talked about your study with Mr. Hunt.

A Uh-huh.

Q Did you also study the whooping crane diet with your graduate student, Danielle Greer?

A Yes, I did.

Q And approximately when did those field studies begin?

A The field studies began in the -- the intense field studies for Danielle began in the fall of 2003.

Q And what was the focus of that study?

A The focus of her study was to -- it was part of the SAGES

project, but the focus of her study was to look at crab abundance and availability and how the crab -- and how the -- and the food habits of whooping cranes in lieu of blue crabs and the importance of wolfberries.

Q Now, are the results of Ms. Greer's study attached to the expert report as Appendices A and B?

A Yes, they are. Uh-huh.

Q Let's look at the documents reflecting the result of Ms. Greer's study.

(Whispers heard off the record)

MR. FERNANDES: Defendants' Exhibit 224.

Does this appear to accurately reflect the various food items in the diet of the whooping cranes during the two winters of Ms. Greer's study?

THE WITNESS: Yes, it does.

BY MR. FERNANDES:

Q And is this the first time when the diet was presented anyway on a monthly basis as opposed to an annual basis?

A Yes, it was.

Q Now, did Ms. Greer do a fecal analysis study?

A No, she didn't.

Q So, let's talk about -- we forgot one of the studies. We talked about the study that you had with Mr. Hunt; then, there was another study that was done by Dr. Chavez-Ramirez on the whooping crane diet, was there not?

A Yes.
Q And Dr. Chavez-Ramirez's study was also a fecal analysis approach, correct?
A That's correct. That's correct.
Q So, what approach did Ms. Greer take in connection with her study?
A Well, she did -- there were two parts of her study in terms of food. One was availability, which is, how available were the different food items by month; and the second was what the cranes are actually eating, which is depicted on this slide, what the cranes are eating, by observations, both with binoculars as well as with telescopes and video cameras.
Q In connection -- I'm trying to figure out how she went about determining what the cranes were eating. Did she just go back and look at videotapes, or did she actually record what they were eating by microphone while she was observing the cranes?
A Well, she took notes while she was recording, but primarily this analysis comes from analysis of videotapes.
THE COURT: Videotapes that who took?
THE WITNESS: That Dr. Greer took in the field; this student.
THE COURT: How many hours of videotapes?
THE WITNESS: Hundreds of hours.
//

BY MR. FERNANDES:

Q And have you reviewed some of those videotapes?

A Yes, I have.

Q And they've been produced in this case, have they not?

A Yes.

Q Do you understand that TAP's expert, Dr. Chavez-Ramirez, has testified that he can't determine what those cranes were eating from those videotapes? Do you know how it was that Dr. Greer was able to determine what those cranes were eating?

A Yes. She, of course, was a graduate student that has an infinite --

THE COURT: She just asked them.

THE WITNESS: Pardon?

THE COURT: She just asked them.

THE WITNESS: Yeah.

(Laughter)

THE WITNESS: Yeah.

Well, she has a lot of time, as a graduate student, to review and review and review tapes, even though the tapes are very difficult to review. She watched cranes feed without tapes. She captured all of the food items in the field that cranes eat. She got to know the feeding behavior of cranes. It was a long training process over two to three years, and then, at the end of those two to three years, then she started her analysis.

She was at a point when she could get very minor glimpses of a food item; she could -- she was able to look at the behavior of the cranes. They do different things in eating different kinds of food. They chase some foods; they probe for others; they pick for others. And by looking a little bit at behavior in relationship to the tapes, she was able to take small segments of tapes and use those to determine this kind of analysis.

THE COURT: Can I ask; have you done your own field studies on whooping cranes?

THE WITNESS: Have I done my own field studies?

THE COURT: Yes, sir.

THE WITNESS: With my students only.

THE COURT: No; I mean physically come down and study and done them.

THE WITNESS: I have been down there with my students, yes.

THE COURT: But not like the students have.

THE WITNESS: No. No, no.

THE COURT: So, you're relying on what they found to form your opinions.

THE WITNESS: That's correct.

THE COURT: Okay.

THE WITNESS: I relied on Howard Hunt; I relied on Felipe Chavez-Ramirez; I relied on all of my students. And

I -- I have been --

THE COURT: And your job is to make sure their methodology is sound --

THE WITNESS: Yes. I have been there with them --

THE COURT: -- and that their sample population --

THE WITNESS: I have been there with them and heard them explain their methodology, see it operate --

THE COURT: Sure.

THE WITNESS: -- and, so, there is a certain amount of faith --

THE COURT: Absolutely.

THE WITNESS: -- that goes into it. And I train good students.

THE COURT: Apparently.

BY MR. FERNANDES:

Q Now, are there any advantages with the behavioral observation methodology that Dr. Greer used as compared with the fecal analysis that you did with -- well, I guess it's now Dr. Hunt --

A Uh-huh.

Q -- and the fecal analysis that Dr. Chavez-Ramirez did?

A They -- let me speak to the disadvantages. The advantages are you've got the poop right in your hand, so to speak, and you can sample it and sample it and sample it. But the disadvantages to fecal analysis are that in the marsh, where

there's water, when this lands in the marsh, this fecal pellet tube lands in the water, it slowly dissolves away. When you try to pick it up, you get just a few grains left. But on the uplands you can keep it compact and together. But in the marsh, where Dr. Greer worked, and which was the focus of our research, the SAGES research, the marsh, there was water. And when they pooped in the water -- sorry -- when they dropped their feces in the water, they -- we lost --

THE COURT: I wish my grandsons could hear this.

THE WITNESS: Pardon?

THE COURT: I wish my grandsons could hear this. They would love it.

(Laughter)

THE WITNESS: And that's one thing; it's hard to keep the fecal matter intact.

The second thing is the differential digestibility of different food items needs to be worked out. And there is some concern about differential availability to evaluate wolfberries in fecal exams.

I think that there are just different ways of getting at the same thing, but this is certainly what they eat, because you can see it go down.

BY MR. FERNANDES:

Q Now, is it a fundamental concept in science that the methodology should be repeatable?

A That's correct.

THE COURT: Should be what? I didn't --

THE WITNESS: Repeatable.

THE COURT: Okay.

THE WITNESS: That's absolutely correct.

BY MR. FERNANDES:

Q Do you believe that Ms. Greer's methodology is repeatable?

A Yes.

Q Why?

A Well, it is, but you have to train yourself to do it. You cannot just, oh, prop a videotape and look at it and get the same results. You have to train yourself, and you have to spend the time with the birds, cueing different foraging techniques of the birds to food items captured. You have to see where the food was taken. Was it on the vegetation; was it on the mudflat; was it in the mud or the mudflat; were there probing involved; did they shake the item if it was a crab, or did they just peck at it if it was a berry, a wolfberry? So, you've got to train yourself to do that, and then you've got to have lots of time to watch, go back, watch, go back, watch, go back.

THE COURT: Does Dr. Chavez-Ramirez have that expertise?

THE WITNESS: I think he could if he would have spent the time on it, and -- there is a different level of technique

of watching the behavior of cranes where we're -- Dr. Chavez-Ramirez is very good at macro behavior of cranes and what their behaviors are, flight behavior, movement, aggressive behavior, foraging steps, but where hers went to the next level in foraging behavior, which is intense evaluation of the foraging act itself.

BY MR. FERNANDES:

Q Now, I notice that the data for the month of February is missing for the winter of '04-'05. Why is that?

A Dr. Greer and, in fact, our entire team -- we pulled the team off of the refuge in the month of February. We had a tragic accident with -- one of our technicians, our field technicians, drowned in the field, and with Dr. Greer, and it traumatized our students. And, as a result of that trauma, I thought they needed to get well first; then we'd go back to cranes. So, there was no data gathered in February that year.

Q What, if anything, did you learn from this study?

A Well, I think the important thing is that when you see it portrayed by month, I think you get the real sense that cranes eat different things during the course of the annual -- the part of the annual cycle that they're in Texas. And almost all of my students -- Hunt, Chavez-Ramirez, as well as Greer -- that have studied food habits have found a similar pattern. That pattern is wolfberries early, crabs in the middle of the time frame, and then snails and clams and insects in March and

April. That pattern is very present in this.

The second thing is they eat a lot of different things. They eat -- it's not just crabs and wolfberries. It's insects; it's snails. And, so, it's a -- it kind of opens your eyes to the variety of this omnivorous foraging behavior.

Q Now, you mentioned that, in addition to doing this study on the crane diet, Dr. Greer also looked at the availability of, I guess, blue crabs?

A She did. She looked at the availability of food, and one of the major food items was blue crabs. Right.

Q And why was that also part of the study in addition to just studying the diet?

A Well, we were tasked by our sponsors on the project to evaluate the relationship of crabs, in particular, to freshwater inflows. And, so, we had to get availability of crabs, but we chose to look at everything that she was able to catch to get availability.

Q Let's talk about how Dr. Greer went about sampling blue crabs, Defendants' Exhibit 414.

Do these pictures show how Dr. Greer was sampling blue crabs?

A Yes, it does.

Q And who designed this sampling procedure?

A The sampling procedure was designed in collaboration between myself, Danielle Greer, and one of our science advisory

team members with National Marine Fisheries Service, Tom Minello.

Q Could you walk us through these pictures and describe for us how it is that Dr. Greer went about sampling the blue crabs.

A Okay. First, we were working in the marsh and just outside the marsh. The marsh is right there, and this little area about 10 meters outside the marsh was our ecosystem. And I must say that, to the best of my knowledge, this is the only study that I know that has studied marsh crab numbers and food of whooping cranes in the marsh.

There are two ways that Dr. Greer -- now Dr. Greer -- captured food. One is this boom system. This is a boom, a floating raft, with a large, heavy, aluminum trap on the end. And she would float it out to where she wanted -- she would pick a random spot in this open water and throw a lever back here, and this would land in the water and capture everything, and she would capture everything inside it. That's good, but once you get in the marsh, you can't use that in the marsh. And, so, no one studies crabs in the marsh. As a result, it's -- but that's where cranes feed.

So, she developed a kind of trap like this that looks kind of easy to throw, but it's hellaciously heavy, and it took two people in the field -- this happens to be her technician husband -- they were throwing the trap in the field, and it would land in a pool of water that you couldn't get a boat to,

and then she would dip out all of the food items from it and, based on that, would be able to count the number of crabs or fish or whatever she caught.

Q Now, what was the crab sampling methodology that Dr. Chavez-Ramirez utilized years earlier, back in the early nineties, when he did his field work?

A He used crab pots, commercial crab pots that were used to get blue crabs you might get at a restaurant. But he used those in open -- in bays and in large pools in the marsh.

Q And do you have an understanding of how Mr. Stehn goes about surveying crab abundance?

A Mr. Stehn goes at the top of the territories. At the upper end of a territory he walks a hundred meter; walks and counts crabs that scurry away from him.

Q Of the three approaches that we've discussed that were utilized to measure crab abundance, which approach do you believe was most effective?

A I believe the crab throw, the one that Danielle Greer used, is most effective, because it allows you to fairly and equally survey the entire territory used by cranes for food items. Otherwise, you are forced to use just part of the territory, as Mr. Stehn does, or use crab pots in open bodies of water.

Q Let's talk about the location of the crab sampling, Plaintiff's Exhibit -- I mean Defendants' Exhibit 413.

A Uh-huh.
Q Does Defendants' Exhibit 413 reflect the various locations where crab samplings were done?
A It does.
Q And are all of those sampling sites on Blackjack Peninsula?
A They are. There are three different territories there: one, Boat Ramp territory, Pump Canal, and Pipeline Sundown Bay.
Q Why was Blackjack Peninsula selected?
A Blackjack Peninsula was selected on the advice of our advisory committee to focus our study efforts in an area that was relatively easy to get to, traditionally used by cranes, and that we could focus all of our attention on our SAGES research project in one study area and get a better ecosystem look at that marsh habitat that way.
Q Now, if you had an unlimited amount of funds, would you have liked to sample blue crabs in other areas as well?
A Oh, certainly. I mean, there are plenty -- this only makes up -- Blackjack Peninsula -- only 25 to 30 percent of the population of whooping cranes, and certainly we would like to have gone over to Matagorda Island, but you can’t concentrate and focus areas with our resources.
Q Did Ms. Greer sample blue crab abundance in the size classes that whooping cranes actually eat?
A Yes, she did. The -- yes.

Q Okay. And you were going to go on.
A Right.
Q Could you explain how it is that she went about sampling blue crab abundance in the size that the cranes actually eat?
A Of course, now, this slide is of their -- what they forage on.
Q Let's go back to --
A But we -- yeah, this territory, we -- she used her sampling technique in the field, the big booms as well as the marsh throw traps, to catch food items that way.
Was that the question you had?
Q Yes.
A Okay.
Q Now, as a result, let's go to Defendants' 224. And we've talked about the study --
A Uh-huh.
Q -- with Mr. Hunt -- or with Dr. Hunt now -- in 1983-1984, and we've come forward all the way to the study with Dr. Greer.
As a result of Dr. Greer's blue crab study and the results of her study of the diet, has there been an evolution in your thinking regarding the whooping crane food choices?
A Yes. I alluded to that early on, that you certainly have got to do what you can do, if you're a graduate student or a faculty member or a researcher, to use local knowledge to help you understand a system. And we did that with Howard Hunt. We

did it with Mary Anne Bishop studying subadults, identifying where the subadults are, and things of that nature.

Well, but it tends to -- if one is not careful, one gets locked in to those kinds of observations. And we, in fact, should have paid more attention to my hero, Robert Porter Allen, who identified 40 some different kinds of food items of whooping cranes. We focused in Howard Hunt's effort on blue crabs and wolfberries and acorns and a few things that we were told important. We come through and Felipe Chavez-Ramirez found other things that were important; and then this study certainly a wide variety of food items in the diet of a crane. And it just opened my eyes in our recent, last decade's research on whooping cranes, that one has got to have a fair, open hypotheses and not throw anything out before you start. And that's what Danielle Greer did.

Q Now, do you understand that TAP is contending that if blue crabs and wolfberries are not sufficiently abundant and available that whooping cranes die? Do you agree with that?

A No.

Q Why not?

A Because cranes are omnivores. Cranes are top-level predators. And they will use what's available to them in the marsh or in the uplands. They will, if a -- they will do a cost-benefit analysis. They take the cost of foraging, the cost of handling, the cost of consuming a food item, and they

marry up that with the density of that food item in the environment, and they put those -- that cost-benefit analysis together, and if a food is really abundant and easy to catch, they'll eat it. If food is not very abundant and difficult to go after, they will switch. And, in fact, that's what we find here.

If one were to look at -- I believe it's that second year's data. If one looks at the availability of blue crabs in that second year, they were eaten, but not very much. And you can see they were the same availability in November and December, but the foraging observations she made in December showed that wolfberries were the dominant food, and the crane is making those choices based on a optimal foraging strategy.

Q Let's look at -- first, I guess it's November of 2004, 2005. It shows the cranes eating virtually a hundred percent, at least on the diet analysis, wolfberries, correct?

A That's correct.

Q Now, based upon the crab sampling, were crabs available in November of 2004?

A That's correct.

Q And, so, why -- and, so, what is your opinion, then, with respect to why, if crabs were available in November of 2004, the cranes chose to eat wolfberries instead of blue crabs?

A Well, wolfberries are easy to catch. I mean, you just walk up to a bush and pick, pick, pick, pick, pick, pick, pick,

and you eat all of the food items; walk, take another step, pick, pick, pick, pick, pick. And you get a significant amount of protein from a wolfberry, as well as a crab, so you -- why not? I mean, if it's easy to catch and they're all over the place. And, for all I know, they may be like ice cream; and I'm a killer for ice cream.

MR. FERNANDES: Your Honor, is this a good place to break for lunch?

THE COURT: It is. Thank you.

THE WITNESS: Oh. Ice cream. Yes.

(Laughter)

THE COURT: We all scream.

All right. Anything -- you can step down.

(Witness stepped down)

Anything to take care of?

MR. KAHNE: No.

THE COURT: Okay.

MR. FERNANDES: Three-day weekend is good.

THE COURT: Pardon?

MR. FERNANDES: A three-day weekend is good. It tends to make it easy to resolve all issues.

THE COURT: It is nice, isn't it?

(A recess was taken from 11:57 a.m. to 1:30 p.m.; parties present)

THE COURT: You may proceed.

How are you doing, Mr. McCarthy?

MR. MC CARTHY: Very well, your Honor. Thank you.

THE COURT: Do you want to move back?

MR. MC CARTHY: I'm -- everybody seems to be happy to have me over here.

(Laughter)

THE COURT: Only if you're happy.

MR. MC CARTHY: Thank you.

MR. FERNANDES: May we proceed?

THE COURT: Yes, sir.

DIRECT EXAMINATION (CONTINUED)

BY MR. FERNANDES:

Q Let's talk about whether the events from the winter of 2009-2010 support TAP's contention that wolfberry -- I'm sorry -- that whooping cranes die if blue crabs and wolfberries are not abundant.

Let's look at Mr. Stehn's blue crab counts for the winter of 2008-2009 and compare it with his blue crab counts from 2009-2010. This is Defendants' Exhibit 6 and Defendants' Exhibit 7.

If you look at this, Mr. Stehn's surveys, wasn't Mr. Stehn's average blue crab count for the winter of 2008-2009 higher than his average blue crab count from the winter of 2009-2010?

A Yes.

Q Okay. And, so, do those averages that you see on this visual reflect the average capture rate across the winter?
A They do among the -- one, two, three, four -- five surveys. Right.
Q And what does average -- what does "capture rate" mean?
A This would be the number of crabs seen on the surveys.
Q And let's look at that for a while, because on 2008, do you see there in November -- well, first of all, would you expect blue crabs to be high in November and December of any given year?
A I think -- I don't know if that's high. It's only one sample, and -- but I would not -- that's a goodly number; no question about it.
Q Let me put it this way. Are blue crabs generally not very abundant in January or February of any given year?
A Generally, they are not abundant enough to cause cranes to switch to eat them. They will eat other things in that month.
Q Let's look at Mr. Stehn's wolfberry counts from the winter of 2008-2009, which is Defendants' Exhibit 6, and compare it with his wolfberry counts from the winter of 2009-2010.

Are you with me?

A Yes. Yes.
Q And if you look at this comparison, you see, do you not, Mr. Stehn appears to have only done four surveys during the winter of 2008-2009?

A Yes. I see that.
Q And, so, what we try to do is look at similar months, November, December, and February, and compare them against the same months that were done the following year, November, December, and -- I'm sorry -- November, December, February.

At least from those three months, if you assume the accuracy of these surveys, didn't Mr. Stehn report that, at least from those months, wolfberry crop was not significantly better than 2009 and 2010?
A It looked to be very similar to me, yes.
Q Now, if cranes die if wolfberries and blue crabs are not abundant, as a scientist, would you expect similar mortalities given these crab and wolfberry surveys that we have just seen?
A If the hypothesis is that lack of crabs or berries leads to death, I would expect them to be -- you would expect similar mortalities in each year.
Q Didn't Mr. Stehn report 23 mortalities in the winter of 2008-2009 and only one mortality during the winter of 2009-2010?
A That's correct.
Q Let's talk about carryover effects.

If the cranes were suffering food shortages during the winter of 2008-2009, would you expect the flock to experience higher than average mortality during the following non-winter period?

A That would be a hypothesis that I would posit in order to further look into it. Right.
Q And why is that?
A Well, you would expect as their condition -- if they're in poor condition, they may be less successful in future parts of the life cycle, the spring migration, the breeding season, at least that much.
Q Is there any literature that supports that hypothesis?
A There is literature in things like petrels and some songbirds about migration and the impacts of poor condition leading up to breeding. There is literature, right.
Q Now, in connection with the expected higher non-winter mortality, has that ever been studied?
THE COURT: In connection with what? I'm sorry.
MR. FERNANDES: I'm sorry.
BY MR. FERNANDES:
Q The hypothesis that if cranes are suffering food shortages during the winter you would expect higher mortality; has that ever been subject, that hypothesis, to any study?
A Not mortalities leading to the next part of the annual cycle, no.
Q Now, following the winter of 2008, two thousand --
THE COURT: I'm sorry; did you -- was that the answer to the question?
MR. FERNANDES: Now, let me go --

THE WITNESS: What was the question?

MR. FERNANDES: Let me ask the question again.

BY MR. FERNANDES:

Q Is it a hypothesis that, if the cranes are suffering food shortages during a particular winter, you would expect the flock to experience higher than average mortality during the following non-winter period?

A Yes.

Q Has that hypothesis ever been the subject of a specific study?

A No.

Q Okay. Does that hypothesis appear in the -- in Mr. Chavez-Ramirez's -- Dr. Chavez-Ramirez's dissertation?

A I don't recall it being there, no.

Q Has the whooping crane recovery team stated that the average non-winter mortality for this flock is eight percent?

A Yes. Approximately eight percent. Right.

Q Following the winter of 2008-2009, when 23 whooping cranes allegedly died, was the mortality of the flock during the non-winter period reported to be only five?

A Only five birds. Right.

Q Isn't that approximately two percent?

A Yes.

Q Has the recovery team also stated that the average non-winter mortality is usually approximately five times higher

than the average winter mortality at Aransas?
A Yes.
THE COURT: I'm sorry; say that one more time.
BY MR. FERNANDES:
Q In other words, in -- in English, generally speaking, has the recovery team stated that you would expect the mortality outside of Aransas to be five times as high as the mortality -- the mortalities within Aransas?
A Yes.
Q In other words, if five cranes died in Aransas, you would expect 25 cranes to die migrating to Wood Buffalo, and then coming back to Aransas the following fall.
A Yes.
THE COURT: Why is that? Is that a study?
THE WITNESS: That was the recovery team's -- the recovery -- the whooping crane recovery plan. That's just from that.
THE COURT: Do clams in these bays and estuaries also rely on fresh water?
THE WITNESS: The clams rely on, like everything else in the estuary, on nutrient load from inflows. I mean, everything in the estuary --
THE COURT: For fresh water? Okay.
THE WITNESS: -- from nutrients that come down with the fresh water. Correct.

THE COURT: So, they could be affected also with the lack of fresh water or high salinity?

THE WITNESS: Well -- yes.

THE COURT: Okay.

BY MR. FERNANDES:

Q If you believe Mr. Stehn's numbers, didn't he report just the opposite occurred? In other words, that 23 cranes died at Aransas and five died during the migration to Wood Buffalo, while at Wood Buffalo, and while migrating back to Aransas?

A That is correct.

Q Now, although you weren't present, Mr. Stehn testified that the 23 mortalities is his conservative estimate; the actual mortalities during the winter of '08-09 were probably higher than 23.

Now, if the actual crane mortality during the winter of 2008-2009 was higher than 23, wouldn't that mean that even fewer than five cranes died during the migratory period to Wood Buffalo and back to Aransas the following year?

A In order to keep the numbers that he observed in '09-'10 arriving back from Wood Buffalo, you would have to have a diminishment of mortality on the breeding grounds.

Q So, for example, if 28 cranes died at Aransas during the winter of 2008-09, that would mean that no cranes died while migrating to Wood Buffalo, during the time at Wood Buffalo, and while migrating back to Aransas the following fall.

A That is correct.
Q Based upon your experience studying these cranes, does that make any sense?
A It's not a hypothesis that you would expect to come true. Let's put it that way.
Q Now, if the cranes were suffering from food shortages during the winter of 2008-2009, would you expect the cranes to delay their migration back to Canada?
A That's -- that is a reasonable hypothesis. It's been found in other birds. Right.
Q And did the whooping cranes delay their departure to Canada following the winter of 2008-2009?
A In the spring of 2009, the cranes left either a little bit early or on average at the same time.
Q If the cranes were suffering food shortages during the winter of 2008-2009, would you expect the cranes to experience low reproductive success while in Canada?
A That would be a hypothesis that would be -- one that could be tested, and I would expect that; right. If they were in poor body condition when they left here, breeding successfully would be diminished, the likelihood, in Canada.
Q Is there literature to that effect relating to other birds?
A I think that's been identified in mallards, the mallard ducks, the effects on the breeding season. But it's very

difficult to study. I don't think there is literature that -- I don't want to use the word "prove," but shows that.

Q Let's look at Defendants' Exhibit 123.

Have you seen this article by Mr. Stehn and Mr. Taylor before?

A Yes, I have.

Q Let's go to page 149. Do you see there where it talks about movements also increase when cranes are forced to fly to freshwater ponds to drink when marsh salinities exceed 23 parts per thousand?

A Yes.

Q does -- you've read Allen. Does Allen make any such claim?

A No.

Q Does the reference there to Hunt 1987 refer to the dissertation that Howard Hunt wrote while he was your student?

A Yes.

Q Does the data of Mr. Hunt support any such claim?

A No.

Q Are you aware of any scientific study that supports the argument that cranes need to fly to fresh water to drink at certain salinity levels?

A I know of no scientific study that has evaluated the threshold of 23 parts per thousand, or any other threshold, that caused cranes to move to the uplands to drink.

Q Have you reviewed Mr. Stehn's reports over the years?
A Yes, I have.
Q And from reviewing those reports, have you seen Mr. Stehn report different salinity values over the years, such as 1990, 6 to 24 parts per thousand; 1991, 21 parts per thousand; 2009 we're at 23 parts per thousand; 2011 we're back to 18 parts per thousand.

Have you seen that movement in Mr. Stehn's threshold salinity levels?
A Yes.
Q What, if anything, does the arbitrary and evolving nature of Mr. Stehn's thresholds, salinity thresholds, over the years demonstrate to you?
A Well, to me it shows that there has been no scientific evidence brought to bear on the subject, no scientific studies that have evaluated different thresholds in movement of cranes.
Q Now, if one of your students observed cranes flying to fresh water when salinities exceeded 23 parts per thousand, would that support a scientific conclusion that cranes are forced to seek fresh water when salinities exceed 23 parts per thousand?
A No. It would not. If coupled with multiple observations, it might make a hypothesis that one could test scientifically.
Q Are anecdotal observations a substitute for science?
A No, they are not.

Q During the winter of 2008-2009, was Fish and Wildlife Service engaging in activities that induced the cranes to fly to the uplands?
A Yes.
Q Is it possible that while the cranes were in the uplands because of the prescribed burns they visited the ponds?
A Yes.
Q Do the ponds provide a source of food for the cranes?
A Yes, they do.
Q Have there been specific studies in literature that describe and discuss the food in those freshwater ponds?
A Yes. Mr. Hunt looked at freshwater ponds, and Mr. Hunt also observed birds that arrived at the burns walking to ponds afterwards.
Q Is it possible that while the cranes were visiting the supplemental feeders that were placed next to those ponds they visited the ponds?
A Certainly.
Q Is it possible that the cranes derived sufficient fresh water from food sources from the marsh?
A That is a hypothesis that would need to be looked at. That’s correct.
Q As a scientist, are these some of the alternative explanations that you would need to be -- that would need to be evaluated as part of your study?

A They not only represent part of the alternative, a hypothesis that would need to be checked, alternative hypothesis testing is part of sound science, and it's incumbent that sound decision-making bodies use the soundest science possible.

Q Let's talk about the distance between the salt marsh territories and the freshwater ponds.

A Uh-huh.

Q Approximately how far are the freshwater ponds from the cranes' territories?

A Some of the ponds are about a third of a mile from the territories, nearest territories.

Q Do you understand that TAP is contending that the flights to these uplands constitute a significant energetic burden?

A Yes.

Q In your opinion, do these flights constitute a significant energetic burden?

A I cannot conceive of an animal that makes two annual 2,500-mile flights being faced with an energetic burden of flying three-tenths of a mile to a pond and back. So, it's highly unlikely, for me, that it would be energetically expensive.

Q Let's talk specifically now about Dr. Chavez-Ramirez's opinions regarding food shortages during the winter of 2008-2009.

Could we see Defendants' Exhibit 124? Could you pull it up a little bit more? No, no; pull it up just so I can see it first. Go back to the first page and just -- the old-fashioned way.

Have you had an opportunity to review this document before, Defendants' Exhibit 124?

A Yes, I have.

Q Do you understand that this is the document that Dr. Chavez-Ramirez gave to Mr. Stehn that reflects his observations from his five-day visit during February of 2009?

A Yes.

Q Let's look at what Dr. Chavez-Ramirez's objectives were when he visited the refuge. Let's go specifically to paragraph (f).

Do you see there where it says:

"Specifically, we wanted to evaluate the following, collect general observations suggestive of stress conditions of whooping cranes"?

Do you see that?

A Yes, I do.

Q Now, if one of your students came to you and said, "Dr. Slack, I'm going to do a study to collect general observations suggestive of stress conditions of whooping cranes," what would your response be?

A Well, I famously tell my graduate students that the dictum

applies here; the dictum of if I hadn't have believed it, I wouldn't have seen it. And when you develop hypotheses, they need to be fair hypotheses that allow for a pro and con in the data that are collected. This almost suggests like the other data are not going to be collected.

Q Let's go to Plaintiff's Exhibit 20, Figure 6. And let's talk about Dr. Chavez-Ramirez's opinions regarding patterns of juvenile molting in 2008-2009 or during that winter demonstrating that the juveniles suffered food shortages.

Are you aware of any scientific study that supports Dr. Chavez-Ramirez's opinion that the retention of significant rusty coloration February of 2009 demonstrates that juvenile cranes were suffering food shortages?

A No.

Q Are you aware of any peer-reviewed publications that support Dr. Chavez-Ramirez's opinions that rusty coloration in a juvenile in February of 2009 demonstrates the juveniles are suffering food shortages?

A No.

Q Does the available literature support Dr. Chavez-Ramirez's opinions that rusty coloration in February is indicative of food shortage?

A No.

Q Based upon the available literature, do you believe that there is anything unusual about a juvenile retaining

significant rusty coloration in February of 2009?
A I must say that in order to answer that I would need to have a series of photographs of crane -- juvenile cranes -- during the entire winter, especially December, January, February, March, April, over multiple winters, in order to build a database that allows me to place that animal in that scheme of early, late, problems or problematic. Just picking one animal or two or three animals shot in February -- or photographed in February, certainly doesn't demonstrate that you've addressed that hypothesis.
Q As a scientist, would you ever compare three to five photographs of a crane from one winter with a photo of a crane from another winter if you were asked to assess juvenile molting?
A No, for the reasons that I told you, that there were no -- there was no dataset on the progression, the normal progression of molt in cranes in Aransas in the winter.
Q In your opinion, does rusty coloration of juveniles in February demonstrate food shortages across the winter of 2008 and 2009?
A No.
Q Let's talk about Dr. Chavez-Ramirez's opinions with respect to food consumption rates. Let's go to PX-20, Table One.
Do you understand that Dr. Chavez-Ramirez's opinion

is based upon comparing blue crab capture data from five days in February of 2009 with data across two entire winters?
A That's what the data seems to show, yes.
Q Let's go to Exhibit 224; Defendants' Exhibit 224.
Now, as a scientist, would you ever compare blue crab capture rate data from five days in February of 2009 to data across two winters to evaluate if there were any food shortages?
A No, I wouldn't. Certainly crabs become more abundant in December, January. Comparing something in November back to even as far -- in February, back through November, would be problematic. I wouldn't think that would be a logical thing to do.
Q Well, let's just look at the results of the study that was done -- that Dr. Greer did.
A Uh-huh.
Q And let's just focus on January of 2006 and assume I went out there in January of 2006 and looked at blue crab capture rate.
Now, if I looked at a blue crab capture rate from five days in January of 2006, is that going to tell me anything about blue crab capture rate across an entire winter?
A No.
Q Would selecting February to obtain your blue crab capture data result in bias in your study because of the general lack

of abundance and availability of blue crabs in February?
A Yes.
Q In your opinion, do observations of food consumption rates during five days in February demonstrate that there are food shortages across the winter of 2008-2009?
A No.
Q Let's talk about the opinions with respect to food-seeking behavior, Plaintiff's Exhibit 124, Table One, please.

Do you understand that Dr. Chavez-Ramirez's opinions with respect to probing and progression rates is based upon comparing probing and progression rates from five days in February of 2009 with data across two winters?
A Yes.
Q What does "probing and progression rates" mean?
A Well, when you -- if you can go back to that last slide with the pie chart.

MR. FERNANDES: The Danielle ones; 224. Defendants' Exhibit 224.

THE WITNESS: That particular slide shows the variability of the food items of cranes. And each one of those items is -- the birds use a slightly different foraging technique for. Wolfberries they just peck, peck, peck, peck, peck, peck and eat the berries. Crabs they reach down and grab and maybe do a little bit of probing, but then sit it up and break it up and consume it. Clams they definitely probe into

the mud. Insects and snails; insects, they move after the insects and move rapidly throughout the marsh. So, the birds are using different kinds of foraging behavior based on the kind of food they eat. And, so, to compare just two components, stepping rate, across the entire -- in five days across the entire winter to across the entire winter would not make sense.

Stepping rate for wolfberries is practically nil. I mean, they just stand in one place and eat, eat, eat, eat, eat, and take the berries off the branches and then take another step and eat, eat, eat, eat, eat, eat, for quite a while. They don't have to chase after anything or run after anything or move. So, they -- the comparison is not appropriate at all.

BY MR. FERNANDES:

Q Well, are the cranes' probing and progression rates going to change depending upon the different foods that they're eating in any particular month?

A Yes.

Q In your opinion, does Dr. Chavez-Ramirez's probing and progression rate data from February, 2009, demonstrate that there were food shortages at Aransas during the winter of 2008-2009?

A All, to me, it shows, what the progression rate was for a week in February, 2009, and the probing rate. It does not say anything about food across the winter.

Q Let's talk about another opinion, this breakdown of family units. I'm going to put this in two categories: one parent's refusing to feed chicks and the other one juveniles observed alone without parents. Let's first talk about parents refusing to feed chicks.

Do you understand that Dr. Chavez-Ramirez's opinions are based on observing two crane families over five days in February of 2009?

A Yes.

Q Do you believe that the observations of Dr. Chavez-Ramirez of adults showing aggressive behavior toward juveniles is a function of food shortage?

A I don't believe there is any evidence to tie to food availability.

Q Now, if you were asked to study whether adults showing aggressive behavior toward juveniles is a function of food shortage, would you ever use a sample size of two families over a five-day period?

A No.

Q Now, we talked about a lot of the publications that you co-authored with a number of students and others.

A Uh-huh. Yes.

Q Have there been studies at Aransas that have studied the behavior within the family units of cranes at Aransas?

A Surprisingly enough, no. We have studied foraging

behavior. We have studied habitat use. My students have studied moving to uplands and foraging, but they have not studied the social behavior within family groups. There has not been the interaction, social interaction, behavioral studies.

Q In your opinion, do Dr. Chavez-Ramirez's observations of two adults showing aggressive behavior toward juveniles in February of 2009 demonstrate that there were food shortages across the winter of 2008-2009?

A No.

Q Let's talk about juveniles observed alone without parents.

Did you have an opportunity to review the expert reports in this case?

A Yes.

Q Did you see Mr. -- I'm sorry -- Dr. Chavez-Ramirez's opinion that there were no known instances of juveniles being observed without their parents and having survived?

A Yes.

Q In your opinion, do juveniles die if they are separated from their parents at Aransas?

A Not always.

Q And through branding haven't we learned that juveniles have been observed separated from their parents, in some occasions over 200 miles, and survived the entire winter?

A Yes.

Q Let's move on to another subject. Let's go to Defendants' Exhibit 7.

First of all, do you believe that there is an increased risk of predation in the uplands?

A Yes.

Q Now, have you reviewed Mr. Stehn's August 10th, 2010, report?

A Yes.

Q And in these reports does Mr. Stehn report his observations of upland use on any given winter?

A Yes.

Q Let's look at page 66.

In this report, did Mr. Stehn report observing -- I should say: In this report, did Mr. Stehn observe -- or report observing more cranes in the uplands during the winter of 2009-2010 than during the winter of 2008-2009?

A Yes.

Q In fact, when you look at this, doesn't this reflect that Mr. Stehn reported observing nearly three times more cranes in the uplands during the winter of 2009-2010 than 2008-2009?

A Pretty close to three times. Correct.

Q And despite the observation of all of those cranes in the uplands during the winter of 2009-2010, didn't Mr. Stehn report only one crane mortality during that winter of '09-'010?

A Yes.

Q Now, let's move on to another subject real quickly.

Prior to this lawsuit, did you ever --

THE COURT: I'm sorry. I was writing that down. I missed it.

MR. FERNANDES: Sure.

THE COURT: Only one crane mortality; and was that in '09-'010?

MR. FERNANDES: Yes.

THE COURT: O-nine, ten. Okay.

MR. FERNANDES: Yeah.

THE COURT: Thank you.

MR. FERNANDES: Twenty-three in '08-'09; one in '09-'010.

THE COURT: Thank you.

BY MR. FERNANDES:

Q Prior to this lawsuit, did you ever perform any study to determine the reliability of Mr. Stehn's methodology of assuming missing cranes are dead?

A No.

Q In any of the numerous studies that we have discussed, was there ever a need to evaluate Mr. Stehn's mortality numbers?

A No.

Q Did the results of any of your studies rely on the accuracy of Mr. Stehn's mortality numbers?

A No.

Q Let's talk briefly about SAGES.

Who funded SAGES?

A SAGES was funded by the Guadalupe Blanco River Authority, the San Antonio River Authority, and the San Antonio Water System with in-kind resources provided by Fish and Wildlife Service.

Q How much funding did the SAGES project receive?

A About $2.1 million.

Q In your 38-year career, has anybody ever provided over $2 million of funding to study this estuary?

A I don't know about the estuary, but to study the whooping cranes, I would say no.

Q Did the sponsors suggest the outcome they wanted for this project?

A Absolutely not.

Q Would you have taken part in the study had the sponsors suggested what the outcome should be?

A No.

Q Why not?

A Well, I've had a long career --

THE COURT: You don't have to answer that. He's a scientist; he wouldn't do that. And I accept that.

MR. FERNANDES: Okay.

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BY MR. FERNANDES:

Q Who was on the SAGES team?

A The SAGES team was comprised of three principal investigators from Texas A&M: myself, Dr. Bill Grant, and Dr. Stephen Davis.

Q And Dr. Davis will be here testifying later this week?

A That's correct.

Q Let's look at Defendants' Exhibit 415.

Are these the members of the SAGES science team?

A Yes, it is.

Q And who was on the SAGES science team?

A Well, at the outset of this study, we requested as part of our project that it include an ecosystem review panel that would provide guidance in terms of methodology and concept as we went into the study. And I believe that most of the folks that are there -- there's Dr. Tom Minello from National Marine Fisheries Service; Ken Rose from Department of Oceanography at LSU; Dan Childers in the dark there from, at that time, Florida International; Denise Reed from University of New Orleans; Brian, who is the coordinator, fishery -- Canadian Wildlife -- Brian Johns, Canadian Wildlife Service coordinator; Ed Rykiel from Washington State University; Fred Sklar, a ecosystem modeling expert from the Everglades, South Florida Everglades; Felipe Chavez-Ramirez; and Tom Stehn.

Q How many meetings were there of this ecosystem review

panel?
A Two meetings.
Q And what was the purpose of the first meeting of this panel?
A The first meeting was to look at our preliminary ecosystem model and to suggest modifications to it and approaches to take, which they did, and which we then reorganized our model and our methodologies based on their advice and developed our protocol and methodologies to be carried out by the graduate students on the team.
Q And what was the purpose of the second meeting of this review panel?
A I think to check to see if we had done those things. And we -- they did, and came, and we made presentations about our new approach to the model and new approach to studying the ecosystem, which became one of the most exciting things I have done as a scientist.
Q Now, did you also meet with the sponsors of SAGES?
A Yes.
Q What was the purpose of those meetings?
A We met with -- we did not meet with the hierarchy. We met with the managers and individuals close to the field, and we gave them progress reports and told them problems we were encountering, and because of our meetings with them, for instance, we encouraged them and they took it upon themselves,

GBRA, to put a monitoring system in Galveston Bay, TCOON 1. And, so, there was that give and take, but they never looked at our model as it was being developed. They heard that we were making progress, and that was it.

Q Now, were there any differences between this project, the SAGES project, and the other studies that we talked about earlier?

A Yes. This project we were asked to look at this as an ecosystem, these territories, and look at not only the linkage of freshwater inflows and bay water to the marsh ecosystems, but to see if it had ran its way up a trophic web to that of whooping cranes. And we -- the fact that we were intensely looking at it as an ecosystem, we had hydrology, we had plant life, we had animal life, trying to tie it all together in one package.

Q How would you describe the team that you worked with, SAGES team?

A Well, we got to know each other probably better than we really wanted to, but we got to know each other over the course of almost four years, meeting almost weekly and working with graduate students and working with undergraduates that assisted on the project. It was one of the most intense, liberating, and scientifically pleasing experiences I have ever had.

Q When was the SAGES report issued?

A It was issued in 2009; the draft in April and the final in

August.

Q Let's look at Defendants' Exhibit 223.

Is that the SAGES report?

A Yes.

Q Let's talk about what impacts blue crab and wolfberry abundance, at least the findings in this report. Others are going to be testifying about that and offering expert opinions, so, if you would, if you could confine your answers just to the findings of this report.

A Okay.

Q Are you with me?

A Uh-huh.

Q What did the SAGES study find regarding the factors that impact blue crab abundance in the salt marsh?

A We found that the relationship of blue crab numbers in the salt marsh was predicted by a complex, nonlinear set of equations that covered the following parameters: territory, habitat type, water levels, wind direction and speed, and salinity.

THE COURT: I'm sorry. Salinity, water flow --

THE WITNESS: Water level.

THE COURT: Water level?

THE WITNESS: Habitat type within a territory. A territory; there are differences among territories. And -- habitat type -- I think that was the fifth one. Salinity.

Yeah.

THE COURT: I thought there was --

THE WITNESS: And wind direction.

THE COURT: Wind direction?

THE WITNESS: Wind direction.

THE COURT: I thought the other one was water inflow. No? Just level?

THE WITNESS: Not at this level. No.

BY MR. FERNANDES:

Q And what did the SAGES study find regarding the factors that impact wolfberry abundance in the salt marsh?

A We found a less complex -- but Dr. Davis will be able to talk more about this, because this was his project -- but we found a relationship between salinity and wolfberry abundance based on freshwater -- it was a positive -- there was a negative relationship based on salinity and wolfberry abundance driven by water, fresh water, in the summer.

Q Did the SAGES study have any findings on what, if any, impact incremental salinities caused by water diversions have on wolfberry abundance?

A Well, our modeler on this project -- Todd Swannack and Bill Grant, the two modelers -- one of the things you do, and that was encouraged by the science review panel, is do sensitivity analysis on our model, which means you hold everything constant and then change one feature. In this case,

if we'd hold all of the other variables constant and changed salinity, if we doubled salinity, it would only change the number of blue crabs per square meter marginally, if at all.

Q Let's go to Defendants' Exhibit 416.

What are we looking at here, Dr. Slack?

A It's an aerial view of one part of one of the territories on the Aransas National Wildlife Refuge Blackjack Peninsula.

Q In your view, what were the most important findings of SAGES relating to this?

A Well, this is really exciting, because this operates much different than marshes along the upper Texas coast all the way into Louisiana. If you can see there, it looks to be an inlet at the bottom. Tidally influenced water or wind-driven water comes in that inlet and spreads out in the marsh behind -- any direction back in about 15 to 20 yards or 50 meters and fills all of those pools up. Then, as those pools become connected, they are filled with crabs; they are filled with fish; filled with organisms and nutrients. And then, as the water recedes, at low tides or by wind, the water follows back out that inlet. But the neat thing is it leaves some of those pools not connected to the bay. And, as a result, they are isolated, and in those pools two things happen. As the water evaporates, they get more saline.

Q Before you go on, let me show you, because I want to try to be a good student, and I know you want me to show your

tree --
A Yes.
Q -- Defendants' Exhibit 417, as you explained this, so let's go to Defendants' Exhibit 417.
A Well, this is -- this is what's one of the neat things we found about this system. It operates like a tree soaking up nutrients, and it comes up that main trunk and spreads to the leaves in the back but fills up the entire marsh. And that marsh, then, is foraged on by wading birds and by cranes and the like. But then it eventually, those pools, unless replenished by high tides, will eventually disappear, and then they'll wait to be filled again.
Q Now, is this the most intensive study that you're aware of, of this ecosystem in the marsh?
A I am aware of no study that has looked at -- looked at the inner workings of a marsh on the lower Texas coast all the way to Galveston, including the work National Marine Fisheries has done. We looked at hydrology; we looked at nutrient loads; we sampled water every 30 minutes, 24 hours a day, take water quality studies on; we really got a look at how this marsh works. Part of the workings of that marsh are macroorganisms like clams, like crabs, like fish, and like whooping cranes, at the top level of that system.
Q Now, after the SAGES -- after the preliminary report was issued, was there a period of comment?

A Yes.
Q And was there some criticisms -- we've already introduced into evidence comments that were submitted by Mr. Stehn, and today we admitted into evidence comments that were submitted by the Texas Park and Wildlife Division. First of all, let's talk briefly about Mr. Stehn's comments.
After he submitted his comments, did you meet with him?
A Yes.
Q And where did you meet with him?
A At Aransas National Wildlife Refuge.
Q And did you -- and what did you and Mr. Stehn discuss about Mr. Stehn's comments to SAGES?
MR. KAHNE: Your Honor, it sounds like the witness is about to testify to out-of-court statements by another witness.
THE COURT: Sustained.
BY MR. FERNANDES:
Q Did you try to address Mr. Stehn's concerns?
A Yes.
Q And did you review the comments that came in from Texas Park and Wildlife?
A Yes.
Q Now, does Texas Park and Wildlife data relating to blue crabs, does that come from the bays or comes from the marshes?
A Almost all of it was from the bays.

Q Now, when blue crabs go into the bays, is that where the --
A (Coughing) Excuse me.
Q I'm sorry.
A Okay.
Q Do the whooping cranes eat blue crabs in the bays?
A They will be at the very margin of the bays and within a few meters, because they don't go out deep into the bays, certainly.
Q Now, sir, I mean whooping cranes eat blue crabs in the marshes, correct?
A Yes.
Q And was the SAGES study directed at the marshes -- blue crab abundance in the marshes as opposed to the bays?
A Yes.
Q Now, are freshwater inflows necessary for a sound estuary?
A Yes.
Q Are freshwater inflows necessary for the health of the whooping cranes?
A As a whooping crane is a part of the San Antonio Guadalupe estuary, certainly they are tied in to that system that benefits from the nutrients that come in from freshwater inflows. But I have a hard time, based on our data from SAGES, seeing the up trophic level impact of freshwater inflows having an impact on a top-level carnivore. They benefit, certainly.

But I can see no way -- we found no evidence, that they were tied. We found no evidence that even salinity, which is a byproduct of that freshwater inflow, could have a major impact on crabs, one of their principal food items, or on wolfberries, one of their principal food items, or on clams, a principal food item. We were never able to find this tie with the freshwater inflow. But I am not going to sit here as a ecologist and say that freshwater inflows are not important to the estuarine system and all of the organisms in that system.

THE COURT: And that's where the whooping crane lives, so I assume -- one would assume that they would have to have that.

THE WITNESS: They would have to have nutrients, that's correct, that --

THE COURT: From the freshwater inflow.

THE WITNESS: That's correct.

THE COURT: Because -- whooping cranes can't live in Nueces Bay because it's dead.

THE WITNESS: Well, I --

THE COURT: Is that right? I mean, didn't somebody testify it was dead?

MR. BLACKBURN: Yes, your Honor; Dr. Montagna.

THE COURT: Is anybody going to controvert that, or can I use that as a fact?

MR. FERNANDES: I don't think it's really any part of

this case, so I don't -- I don't think it --

THE COURT: Well, yeah; because it's got a 40-part salinity and more. So, that means that the -- I don't think that crabs and clams live in Nueces Bay.

MR. FERNANDES: Yeah. I'm not putting on those witnesses, so that's why I can't answer that.

THE COURT: Anybody doing that?

MS. ROBB: Yes, your Honor, and we will have witnesses who can discuss Nueces and Galveston Bays.

THE COURT: Well, just give me a heads up. What's the difference?

MS. ROBB: The difference is that in the --

THE COURT: One's dead and one's not?

(Laughter)

MS. ROBB: Well, I guess it depends on what you think about as "dead," but --

THE COURT: Well, I know. I agree with that. I don't know what that means.

MS. ROBB: Yeah. And that's why the witnesses will explain. But in the SB3 process, there was a finding that Nueces is not a sound estuary based on the conditions there, and it's a complex process, as you would imagine, affecting the quality and quantity of water there.

THE COURT: So, it's not in good shape.

MS. ROBB: I would say that in SB3 the scientists

have found so far that Nueces is not in good shape.

BY MR. FERNANDES:

Q Let's try to close here by just putting up Plaintiff's Exhibit 110.

With endangered species, aren't you always concerned about the future sustainability of the population?

A Well, the effort and the goal of the Endangered Species Act is ultimately to maintain and sustain the biological diversity of our nation and, in part, the globe, but, basically, the United States. And I certainly agree with that, right.

Q Now, in your --

THE COURT: I don't know what that -- what do you mean?

THE WITNESS: The Endangered Species --

THE COURT: Are you concerned about endangered species sustainability?

THE WITNESS: Yes.

THE COURT: Okay.

BY MR. FERNANDES:

Q In your opinion, what is the most critical need of the sustainability of this population of whooping cranes?

A Based on our latest work, I would say that for this population, protecting as much marsh habitat as possible, salt marsh habitat as possible, is crucial, and it's being a little

bit imaginative to identify areas outside the existing areas used by cranes that are salt marshes to protect those for use by cranes. The cranes have a problem in that when they have expanded, they don't just fly up to Galveston and pick out a marsh and breed there. They expand in little concentric circles. So, they're expanding up and down Matagorda Island and up and down the top half --

THE COURT: So, where do they go?

THE WITNESS: Pardon?

THE COURT: They can't go to Nueces Bay.

THE WITNESS: No. They don't want to go there.

THE COURT: Because it's not nice.

THE WITNESS: Right.

THE COURT: So, where do they go?

THE WITNESS: Where do they go? Well, they fill in. If you look at the territories -- and this is an odd map of territories -- but if you look at the territories of cranes on Matagorda Island, they're quite large; maybe two, some of them, two to three times the size of Blackjack Peninsula. On Blackjack Peninsula they may be 200 acres, 150 to 200 acres, in size; they may be 300, 400 acres in size on Matagorda Island.

What the cranes do when they become subadults and pair up, when females are generally four years or older, they pair with males, and then they go set up near one of the existing territories. And, so, they kind of squish themselves

in next to mom and dad or someone else and set up a territory. And, so, they expand very, very slowly. And, so, this population, in order to be sustaining, according to the recovery team, has got to have about a thousand birds if there are no secondary and tertiary populations that are self-sustaining.

So, the existing ones in Florida, the non-migratory flock, the Florida flock that migrates to Wisconsin, those are non-self-sustaining at this point in time. And the same with the Louisiana flock that's been inaugurated. It's not self-sustaining. So --

THE COURT: So, they can't go to Louisiana; they can't go south.

THE WITNESS: Right.

THE COURT: So, what are you suggesting?

THE WITNESS: We protect this estuary as best we can and the marshes and buy up properties or get easements on properties to maintain and protect those --

THE COURT: But without freshwater flow, it will be like Nueces Bay.

THE WITNESS: If -- if you don't protect the water quality. I think Nueces Bay -- I mean, I'm out of my world here, Nueces Bay. But I hear you talking and hearing --

THE COURT: I don't know. I just -- I just heard what the experts have said.

THE WITNESS: I think there are some water quality issues that have -- that are not just salinity issues in Nueces Bay. And --

THE COURT: Well, do you know of any studies that say that whooping cranes can survive in salinity of over -- of 40 percent -- or 40 parts per thousand?

THE WITNESS: No.

THE COURT: Thirty parts per thousand?

THE WITNESS: Well, this bay complex gets 30 parts per thousand.

THE COURT: Not all of it.

THE WITNESS: Right.

THE COURT: In a bay complex that's --

THE WITNESS: In parts of the territory --

THE COURT: -- that's entirely -- that's entirely 30 parts or higher.

THE WITNESS: Parts of the territories get --

THE COURT: Entirely.

THE WITNESS: No.

THE COURT: If the --

THE WITNESS: No.

THE COURT: If the salt marsh were entirely 30 parts or higher --

THE WITNESS: No.

THE COURT: -- would the whooping cranes survive?

THE WITNESS: It would be pushed.

THE COURT: Okay.

MR. FERNANDES: Pass the witness.

MR. KAHNE: Your Honor?

THE COURT: And I agree with you about Nueces County. I think there's fertilizer issues and refinery issues and --

THE WITNESS: Right; water quality. Right.

THE COURT: -- all kinds of problems.

THE WITNESS: Yeah.

THE COURT: But I think just the salinity -- if there wasn't any of that, but just salinity alone, I assume that you couldn't have a lot of estuaries, I mean, shrimp and whatever.

THE WITNESS: Dr. Davis will talk to that.

THE COURT: Thank you.

You may.

MR. KAHNE: Thank you. I'm prepared to go forward, if the Court please. On the other hand, they have asked for a break every hour and a quarter, so it's been an hour, and if you want to take that break now, and then I won't interrupt 15 minutes in, or I'll go.

MR. FERNANDES: Well, I talked to --

THE COURT: Who asked for a break every hour and 15 minutes?

MR. KAHNE: I thought that's what I had heard someone --

MR. FERNANDES: Well, if Dr. Slack needs to have a --

THE WITNESS: I'm okay.

MR. FERNANDES: -- if he needs to break, he --

THE COURT: Oh. Would you like a break?

THE WITNESS: No. We can go to 3:00. I feel comfortable.

THE COURT: Is that all right with you?

THE WITNESS: Sure.

THE COURT: You just let me know if there is a problem.

THE WITNESS: Okay.

THE COURT: I thought it was Mr. Fernandes --

THE WITNESS: Oh.

THE COURT: -- whining again.

(Laughter)

MR. FERNANDES: I was actually whining on somebody else's behalf

THE COURT: Thank you. That's fine.

(Pause)

CROSS EXAMINATION

BY MR. KAHNE:

Q Good morning, Dr. Slack.

A Good morning. Good afternoon.

Q Good afternoon, Dr. Slack. Good morning, to me.

My name is Dave Kahne. I'm one of the lawyers in

this case.
A Okay.
Q To your knowledge, have there been any whooping crane deaths this year, this winter?
A I heard that there was one, when I walked in the courtroom the other day.
Q Do you know that the Fish and Wildlife Service found this crane death even before they began doing any aerial surveys?
A I have no knowledge of the circumstances of it.
Q So, you don't know that they actually found the carcass.
A Well, I guess I'm learning from you. Yes.
Q Do you recall --
THE COURT: Did you want to just tell us? Do you want to just take the stand and tell us?
MR. KAHNE: Well, I'm not competent to do that. We're going to --
THE COURT: Well, I thought you just were.
MR. KAHNE: Well, I'm --
THE COURT: Is somebody going to tell us?
MR. KAHNE: -- certainly implying it, and we plan to bring back Dr. Chavez-Ramirez.
THE COURT: Okay.
MR. KAHNE: And he will give those details.
THE COURT: Go right ahead, then. Sorry. I am semi teasing you, anyway.

MR. KAHNE: That's all right.

THE COURT: Semi.

(Laughter)

BY MR. KAHNE:

Q PX-32, please.

Do you recall the date that Tom Stehn found the first crane dead in the winter of 2008?

A No, I do not.

Q Okay. Well, December 1st.

A Okay. Uh-huh.

Q That's just about the same -- same week --

A Uh-huh.

Q -- that we've heard the report that the Judge referred to as well.

To your knowledge, have two juveniles been seen wandering alone separated from their parents? Have you heard that?

A This year?

Q This year; this past week.

MR. FERNANDES: Your Honor --

THE WITNESS: No.

MR. FERNANDES: -- I object. It exceeds the scope of direct. And, frankly, all of this information, I guess, they're getting because Dr. Chavez-Ramirez has been at the refuge this week. We can't go to the refuge. Fish and

Wildlife Service --

THE COURT: Why not?

MR. FERNANDES: Well, the Fish and Wildlife Service is not providing the information this year. Every year for the --

THE COURT: Have anybody at any of your two tables, have you not been to the -- seen the whooping cranes?

MR. FERNANDES: Yes, we've been to the refuge, but this --

THE COURT: Has anyone on the tables not seen the whooping cranes?

(Pause; no response)

THE COURT: Everybody has.

MR. FERNANDES: He's talking about a week ago.

THE COURT: No, I'm talking about ever.

MR. FERNANDES: Yeah.

MR. WILLIS: All counsel? I have not, your Honor.

THE COURT: Anybody else on your table not seen the whooping cranes?

MS. ROBB: Your Honor, I've been to the refuge. I have not seen a whooping crane there.

THE COURT: Okay.

Anybody else?

MR. WAITES: I have not, your Honor.

MR. COOVER: It's been a while, but I have.

THE COURT: I know surely you've been over there.

MR. COOVER: I sure have.

THE COURT: Okay.

(Laughter)

MR. KAHNE: He's going to draw us a picture.

MR. CHENOWETH: I have not, your Honor.

MR. FERNANDES: The problem with this testimony is they're talking about what happened a week ago --

THE COURT: I'm just curious.

MR. KAHNE: This is a hypothetical I'm about to give to the expert.

THE COURT: Well, then, do it.

MR. KAHNE: I need to set up the facts to see if he has the information --

THE COURT: I mean, you just say: If, hypothetically --

MR. KAHNE: All right. I'll be happy to do that.

THE COURT: -- it is the following.

MR. KAHNE: I'll be happy to do that.

MR. FERNANDES: And I would ask one thing. If they have facts that we don't have, if we could have some disclosure. Because what -- the problem this year is, generally speaking, we used to -- everybody used to get these biweekly reports. Now if you get on this site they specifically say: We're not giving out -- we're not doing

reports anymore to the addressee list; you've got to get on the website to get it. And we get on, and we don't see much there.

MR. BLACKBURN: Your Honor, I've told Mr. Fernandes and defense counsel this information Friday morning. I asked permission to tell the Court at that time, and I was asked to not. And I've restrained myself from saying anything.

THE COURT: I don't believe you've restrained yourself in anything.

(Laughter)

MR. FERNANDES: Just so --

MR. BLACKBURN: I did for a day, your Honor.

THE COURT: Okay.

(Laughter)

MR. FERNANDES: You said a whooping crane died. You didn't say that you saw two observed, and on and on and on, where we appear to be going. I didn't get up and object when we just heard about one died. I got up and objected when I started hearing observations about wandering cranes and the like, because it's a little unfair, to the extent there's never been any disclosure of that.

MR. WILLIS: I will also point out to the Court -- and, Mr. Blackburn, correct me if I'm wrong -- it was just new news, as we understood it, new news to you at that point in time, that a whooping crane had been found dead. That was the only thing that was relayed to us, and if I'm not mistaken, I

think that was before plaintiffs closed their case. So, and my point to the Court --

MR. BLACKBURN: But it was not confirmed at that time.

MR. WILLIS: Right. It had not been confirmed. That's the way I --

MR. BLACKBURN: It had not been confirmed.

MR. WILLIS: That's the way we understood, and we said, at this point in time, you know, we'd rather not this be presented to the Court. But there was also the opportunity, if there was any evidence to that effect, on plaintiff's case in chief, it could have been brought to -- at least brought up regarding new witnesses --

MR. BLACKBURN: Doctor Chavez --

MR. WILLIS: -- as opposed to counsel standing up and testifying about it.

MR. BLACKBURN: Dr. Chavez-Ramirez was on the refuge at that time, and we did not have access to him, did not get access to him until after we closed our case.

THE COURT: Is there a carcass?

MR. BLACKBURN: There is a carcass. And the carcass --

THE COURT: Is it green?

(Laughter)

MR. BLACKBURN: Not to my knowledge, your Honor. But

it was radio collared, and it was a juvenile, and it was collected, and -- but it has been sent for necropsy.

THE COURT: Where did it go for a necropsy?

MR. BLACKBURN: I presume to the same labs as the others.

MR. KAHNE: He doesn't have a tie today.

THE COURT: Oh, he doesn't?

MR. KAHNE: Dr. Chavez-Ramirez.

THE COURT: Oh. I thought you were talking about Mr. Blackburn.

MR. KAHNE: He has a tie today. It's hidden.

(Mr. Kahne and Mr. Blackburn confer off the record)

THE COURT: Okay.

(Pause)

Be careful of the papers around the microphone.

(Pause)

MR. KAHNE: May I proceed?

THE COURT: Please.

BY MR. KAHNE:

Q Just to be clear, you're not here on behalf of the Audubon Society, right?

A No.

Q Okay. You were aware that they are members of the Aransas Project, the Texas, Travis County and Houston Audubon Society?

A Yes.

Q Are you aware of that?
A Yes. Yes.
Q Isn't it true that everyone who has studied the issue agrees on the great importance of wolfberries to the whooping crane diet at the refuge?
A That's correct.
Q That's certainly your view, right?
A Right.
Q And it's been known at least since the fifties with Robert Porter Allen.
A That's correct.
Q And can we show Plaintiff's Exhibit 42?

It's been documented in virtually all of the -- this is a chart that's previously in evidence, and it refers -- I don't know if you saw this chart before when you were here in court. Okay. So, on the left-hand column we have different food items. There are a variety, as you've testified.

A Uh-huh.
Q And then there is a characterization of importance of the food items to the cranes' survival, and then there are a variety of sources that are listed. Probably hard to see. There is a -- down at the bottom -- well, you can see it on your monitor there.
A Yeah.
Q They list the sources. And you're an author on some of

those papers, I guess.

Do you recognize all of those sources that are listed at the bottom?

A Yes.

Q Okay. Would you agree with the characterization that blue crab is of high importance to the whooping crane diet?

A I'm trying to -- what are those sources, and what do you mean by "high importance"?

Q Well --

THE COURT: I think you already said that everybody agrees that they're important to their diet.

MR. KAHNE: Well, he's testified to wolfberries. I'll come back to that at this point. Let me focus --

THE WITNESS: Uh-huh.

THE COURT: Well, what is the next thing you were asking about?

THE WITNESS: The sources; the sources on the right are listed at the bottom. Is that correct?

MR. KAHNE: That's correct.

THE WITNESS: Okay. All right. I'm slow figuring out. Okay.

MR. KAHNE: All right. And, so, I just -- I'm pointing out this has to do with the diets of the whooping cranes, but I'll come back to that. And let me just focus on wolfberries --

THE WITNESS: Uh-huh.

MR. KAHNE: -- and get through that.

BY MR. KAHNE:

Q You've just testified that, to the best of your knowledge, to the best of SAGES study, and your personal belief, freshwater inflows -- having more freshwater inflows is beneficial to wolfberry production, right?

A Yes.

THE COURT: I didn't hear that. Say that again.

BY MR. KAHNE:

Q Having increased freshwater inflows -- more fresh water -- increases wolfberry production.

A At certain times of the year. I mean, it's got to be at the right time of the year to make that connection. So, increased fresh water --

THE COURT: Well, yeah. Like, in the spring.

THE WITNESS: The spring.

THE COURT: It's not going to help the wolfberries in the fall.

THE WITNESS: No. That's correct.

BY MR. KAHNE:

Q And, so, when do you -- what's your understanding of when the fresh water needs to be there for the wolfberries?

A To my understanding, it's late summer.

Q Okay.

A Does anybody know for sure? I guess it could be like beautiful foliage in the fall; it depends on the spring rains? I don't know.

MR. KAHNE: Well, according to Dr. Sass's --

THE COURT: Is somebody going to tell me?

MR. FERNANDES: Yes --

MR. KAHNE: Dr. Sass's testimony was that freshwater inflows overall, the period that mattered the most was the late summer and then the early fall.

THE COURT: Okay.

MR. KAHNE: From July to December. And that's the same -- that overlaps that period. It's a broader period from him.

THE WITNESS: Uh-huh.

BY MR. KAHNE:

Q You were the lead author in SAGES?

A Yes.

Q And you stand behind the results of SAGES, today, right?

A Yes.

Q And you certainly agree it's important that wolfberries be abundant when the cranes start arriving in October, right?

A That is a partial yes. Remember this bird is a top-level carnivore. This bird optimizes its food. In other words, it compares availability with what you get for it. So, the bird determines how much energy it takes to catch, how much energy

it takes to process, and all of those things, and then how much is there in comparison to other things in the marsh. I could see a situation evolve where there would be wolfberries in moderate abundance, but easy to get crabs in a particular year, and the birds might switch to crabs or switch to insects. So --

Q Isn't it true that all of the studies that have looked at wolfberries and their relevance to the diet of cranes --

MR. MC CARTHY: Objection, your Honor. If I may; I don't believe there has been any evidence of studies of wolfberries presented to the Court today.

THE COURT: Well, I was going to make the same objection. I don't know if I've heard any studies of wolfberries. Have we?

MR. KAHNE: Would you please put Plaintiff's Exhibit 42 back up.

THE COURT: I mean, I've heard --

MR. KAHNE: That's okay. I'm about to --

THE COURT: -- I've heard people say that -- right, that wolfberries are an important part of the diet in the fall.

MR. KAHNE: And the testimony by Dr. Chavez-Ramirez and the evidence as compiled in this Plaintiff's Exhibit 42 ranks wolfberry as a high importance to the diet of cranes. And I'm simply trying to establish whether --

THE COURT: I remember that. That's based on the

various studies that are cited there.

MR. KAHNE: Correct.

MR. FERNANDES: And if you can recall, his testimony earlier was that Dr. Davis is the person who did that in the context of SAGES who will be giving opinions on that. That's why I limited his testimony to just reporting the findings of SAGES.

MR. KAHNE: If I may, your Honor. Two things. First --

THE COURT: Go ahead.

Overruled.

Go ahead.

MR. KAHNE: All right. Then, I'll just keep going.

BY MR. KAHNE:

Q So, my question is: Are you familiar enough with those numerous studies at the bottom, which include some work of your own --

A Yes.

Q -- to agree or disagree with the characterization that wolfberries are of high importance to the whooping crane diet?

A I agree.

Q Okay. Now, I think we've talked about the general relationship of your work and your students' work, and, if I understood it correctly, generally speaking, your work is, or was, at A&M.

A Right.
Q And their work was doing field observations and then compiling the data and writing it up.
A Who is "their"?
Q Your students.
A Oh.
Q We had a chart listing --
A Well, a graduate degree is more than compiling data and writing it up. I mean, they take courses and they learn how to do science, and then they gather information, and then write it up. Right.
Q And, so, my question was: Isn't it true that, as between yourself and your students, it's been your students uniformly who have been doing the gathering of data and the direct observation?
A That's correct.
Q Okay. And certainly their observations are -- the observations of any scientist are critical to determining whether or not the scientific result is valid.
A The observations and methodology.
Q Oh. I agree with that. Good. Okay.

Let's -- I had one question for you before I got into the rest of this. You had talked about Dr. Greer, and my notes were not clear, unfortunately, about what you said.

Did you say that her report is the first report of

the diet of whooping cranes that does not consider fecal analysis or that did? Maybe I got it all wrong.

THE COURT: I thought Hunt had fecal analysis and she did not. She had direct observation with videos.

THE WITNESS: Right. Right. That's correct.

BY MR. KAHNE:

Q So, was it your testimony that she was the first person to do direct observation of whooping crane diet?

A I believe that was -- I believe that's true. Right.

Q Isn't it true that Dr. Chavez-Ramirez in his dissertation with you did direct observation, not fecal analysis, to evaluate the diet of whooping cranes?

A I believe that's correct, but I believe what he published was on fecal analysis.

Q But his dissertation with you --

A Right.

Q -- was direct observation --

A Right. That's correct.

Q -- for which he's testified that he spent literally hundreds of hours in the mud at Aransas looking at cranes.

A I'm sure he did.

Q And you went down, if I understand correctly, what I believe I've heard, one time while he was in the field doing that. Is that right?

A I don't believe it was one time. I think it was more than

that.
Q I made a -- I misspoke. Three hundred days he was there. Six days a week over each of two winters. That would be right, wouldn't it?
A He was there a lot. All of my graduate students were there a lot.
Q Okay.
A Hunt and Greer.
Q Dr. Greer was not the first to do direct observation, right?
A Stand corrected.
Q His thesis that's Plaintiff's Exhibit 13; that was a fine piece of work, wasn't it?
A I couldn't --
Q That was a fine piece of work, wasn't it?
A Dr. Chavez-Ramirez?
Q Yes.
A Yes.
Q He didn't rely on videos to determine what he looked at in the field, did he?
A Not to my knowledge.
Q I have another question. Did you say that Dr. Greer was the first to study the diet directly in the marsh?
A She was the first person I know to study the availability of crabs and food in the marsh from one -- all throughout the

territory. That's correct.
Q Well, isn't it true that Dr. Chavez-Ramirez also studied availability of crabs in the marsh as part of his thesis?
A But he did not study the availability of all of the other items that she looked at in the marsh.
Q Well, we'll get to it, but isn't it true that, in terms of what she studied, in terms of abundance, all she looked at was blue crabs and wolfberries' abundance?
A Yes.
Q Okay. She didn't study whether there were the immense number of insects that you would need to substitute for 70 to 80 crabs a day, did she?
A She didn't -- I don't believe there are data in her dissertation on availability of insects.
Q Okay. And isn't it also true that Dr. Pugesek and colleagues also studied the availability of foods in the marsh; and that's in published literature, isn't it?
A Yes.
Q And we'll come back to this, but isn't it true that, in terms of her analysis, Dr. Greer focused on -- she started with four, but, in essence, she focused on three -- count them -- three of the 200-plus at that time territories in the marsh? It wasn't a marsh-wide --
A That's correct. Right.
Q Okay. Three territories.

A Uh-huh.
Q All right. Part of the work that Dr. Chavez-Ramirez did was intended actually to follow up on the work that you had done earlier with Hunt, wasn't it?
A Right.
Q And both -- well, my notes say before and after Dr. Chavez-Ramirez finished his dissertation, you and he have repeatedly published jointly, haven't you?
A Yes.
Q And several of those papers have been on whooping cranes, right?
A Yes.
Q And additional papers have been on other birds as well.
A That's correct.
Q And you've asked him to join you on committees to review other students' dissertations at this point, right?
A Yes.
Q And you've written letters of recommendation for him, right?
A Yes.
Q Which I think he appreciates. And, generally, he does excellent work, doesn't he?
A Yes.
Q And that's both in terms of observation and in terms of methods, right?

A Yes.
Q And you had talked about Dr. Chavez-Ramirez as being good with, I believe you testified, about being good with macro behavior of cranes.
A Uh-huh.
Q And I didn't understand how you were trying to distinguish foraging behavior. Isn't looking at what a crane does part of its macro behavior when it's looking for crabs?
A Yes.
Q I mean, isn't Dr. Chavez-Ramirez indeed one of the premier, boots-on-the ground scientists who have looked at whooping cranes?
A Yes.
Q And, in fact, he's looked at other kinds of cranes as well around the world, right?
A Yes.
Q One of the things that came up in your deposition was that -- you remember you had your deposition with Mr. Blackburn.
A Uh-huh.
Q And you testified that you had never actually seen cranes drink, right?
A That's correct.
Q But when asked about it, you agreed if Dr. Chavez said he saw cranes drinking in the wild, "If he said it, I accept it as

true." Isn't that right?
A No question.
Q Okay. Briefly, about Dr. Archibald; you gave him a title that I'm not sure he's ever held before, but in the deposition you agreed that he was really the guru of cranes around the world.
Isn't that a true statement?
A I guess that -- I've become pretty famous for that anointing, I guess.
(Laughter)
Q But, indeed, he is one of the foremost experts on whooping cranes around the world.
A He's well known for conservation of whooping -- of cranes.
Q Okay. And do you also agree that that makes him one of the foremost experts on cranes around the world?
A Yes.
Q Okay. And the group that he heads, the International Crane Foundation, is one of the premier conservation organizations around the world as well, isn't it?
A Yes.
Q And certainly both Dr. Archibald and the Crane Foundation are trustworthy and credible, both in the words that they say and the papers that they write.
A I have no reason to doubt that.
Q That's my next question.

THE COURT: These are all trick questions.

(Laughter)

BY MR. KAHNE:

Q Tom Stehn, who has been called by several people in this courtroom "Mr. Crane," you may have known him longer than any of the rest of us.

A That's correct.

Q You -- maybe a couple of decades or more, right?

A I couldn't --

Q Two or more decades, right?

A That's correct.

Q And you said that you consider him a friend.

A That is correct.

Q And --

A I'm a pretty friendly guy. I mean --

Q You know, you come across that way. You do. And my brothers, both of them are professors, and I'm thinking: What would it be like if I was cross examining them? And it's not good.

(Laughter)

So, I'm doing my best here.

A Okay.

Q You've published a number of papers with Mr. Stehn as well since the eighties, right?

A That's correct.

Q One of the things we know about Tom Stehn is that he is a methodical man, and for most of those 20 years, if not more than those 20 years, isn't it true that he has gone out or he has had people working with him gone out and collected data on salinity, crabs, wolfberries, and a variety of other things, very methodically, using his transects?
A That is correct.
Q Those observations couldn't be characterized in any way as anecdotal, right?
A Some of them border on anecdotal.
Q The ones that have been reported consistently for each of the past 20 years?
A That's correct.
Q You don't have any reason to doubt that what he reports in those annual reports from those transects walking, they are accurate reflections of what he has observed, right?
A They are accurate reflections of what he observed. That's correct.
Q You certainly have found Stehn's published -- or excuse me. You've found Stehn's reported information to be reliable enough to be used in papers that you have published together.
A Most of the information that we have cited of Stehn's work are -- I don't do mortality work. I mean, I don't -- I have not done mortality studies of cranes. Most of his -- the citations to Tom's numbers and works represent just statement

of where we are and with no -- no discussion of quality or reliability or anything else associated with it; even in his own -- the papers that we have co-authored together.

Q You may have answered my question, but I didn't hear it.

A Okay.

Q I understand that you're distinguishing between his mortality data, on the one hand --

A Uh-huh.

Q -- and his -- and other data that he collects.

A Right.

Q Okay. And I'm talking first about the other data that he collects, such as with respect to the crabs that he counts --

A Right.

Q -- and the wolfberries that he counts, et cetera. And isn't it true that, in addition to finding his report and believing that he accurately reports what he sees, you also found that reliable enough to be used for published papers?

A Yes.

Q Now, let me ask the same question -- a similar question, about the mortality data.

A Uh-huh.

Q If Tom Stehn says, "I saw a bird," do you believe he actually saw a bird? A crane.

A Yes.

Q And if Tom Stehn says, "I looked real hard, and I flew

perhaps two circles around the territory on a particular day," and he said, "I saw two adults but no juvenile," do you believe that Tom Stehn saw two adults, no juveniles, and looked real hard to find them?

A I don't doubt he looked real hard. But --

THE COURT: Have you ever used his mortality figures in any of your published work?

THE WITNESS: No. I must have.

THE COURT: Pardon?

THE WITNESS: No, no. No. I don't believe so.

THE COURT: Do you know for sure? Or -- well, I mean, if you would know.

THE WITNESS: No; I don't -- I do not believe that we used his mortality data in publications.

BY MR. KAHNE:

Q Before the winter of 2008-2009 --

A Okay.

Q -- which I'll call "the very bad winter" --

A Uh-huh.

Q -- you never had any reason to challenge the accuracy of Stehn's aerial surveys, right?

A No; you have to understand that when my students and I have worked on projects, they have been very goal-directed, goal-oriented, and there was never a need, as I saw, to study his mortality figures and do research on the reliability of

those figures. So, I hadn't paid attention to it.
Q All right. Now, I need to go back, because I just want to make sure I understood.
We have the deposition with Mr. Blackburn, right? And do you recall that Mr. Blackburn asked you:
"In fact, you have relied on those reports" -- referring to mortality reports -- "in many of your publications, have you not?"
And your answer was: "Those are the only data."
And Blackburn objected to the responsiveness and said:
"My question is: You've relied on them in your reports, have you not?"
And do you recall that you answered, "Yes"?
A We -- they --
Q I can put it up if you want. I'm not --
A Well, I mean, I -- the data were not substantive to where we were going in our publications. And accepting them is pretty much just a state of: This is where we are with whooping cranes; this is what we know. And there is no evaluation there of quality.
Q From 1990 -- maybe 1988; let's start in 1988. For the 20-year period, 1988 to the winter before 2008-2009, that 20-year period, absolutely everybody -- isn't it true -- absolutely everybody has always relied on Mr. Stehn's mortality data to

get a picture of: Here's where we are with the cranes?
A Uh --
Q And I tried to take your phrase. I hope I remembered it right.
A Right. I guess the scientific community is flawed, but I must tell you that I did not look to investigate Tom Stehn's numbers at any time during that time. I was dedicated to a research project to look at food or habitat use or movements or fire or cattle, and I wasn't focused on Tom Stehn's data. In fact, I encouraged my students to go learn from him.
Q Every bit of peer-reviewed literature that's been published concerning the years from 1988 until 2008, everybody has used Tom Stehn's data; and isn't it also true -- isn't that true? Mortality data.
A As I told Mr. Blackburn, it's all there was.
Q Okay.
A We didn't have competitive numbers to choose from.
Q In your own expert report you relied on Tom Stehn's mortality data.
A His population numbers or mortality data?
THE COURT: What is the --
MR. KAHNE: Break them apart.
THE COURT: What is the difference?
THE WITNESS: Well, Mr. Stehn produces reports that have numbers of cranes, peak numbers and the like each year,

and during the course of a winter, and sends those out. The mortality evaluations, I never looked at those until the '08-'09 report from Tom Stehn in which he said that 23 birds had died. And that was the first time that it struck me as an incredible number of birds that died, which led to our evaluation. Correct.

BY MR. KAHNE:

Q It was an incredible number. That's more than twice as much as any prior year; isn't that right?

A Allegedly.

Q Tom is not the --

THE COURT: When did you evaluate that? You said, "It led to our evaluation"?

THE WITNESS: We looked at the '08-'09 mortality report for the Guadalupe Blanco River Authority.

THE COURT: When was that? When did you do that?

THE WITNESS: Uh --

THE COURT: As part of --

THE WITNESS: -- '08-'09 --

THE COURT: -- preparing for this, too?

THE WITNESS: -- '09-'10. It was in -- it was in sometime in early -- the winter of '09-'10; sometime around there, or '010.

THE COURT: And who is "we"?

THE WITNESS: One of my graduate students and I.

THE COURT: Who?

THE WITNESS: Robert Powell.

THE COURT: And who hired you to do that?

THE WITNESS: Guadalupe Blanco River Authority.

MR. KAHNE: Excuse me, your Honor, one moment.

MR. FERNANDES: Might this be a good time? It's after 3:00.

THE COURT: Time for a break?

THE WITNESS: Yeah.

THE COURT: Fifteen minutes.

MR. KAHNE: All right. Thank you.

THE MARSHAL: All rise.

(A recess was taken from 3:02 p.m. to 3:28 p.m.; parties present)

THE COURT: Okay.

CROSS EXAMINATION (CONTINUED)

BY MR. KAHNE:

Q Dr. Slack, you've mentioned a phone conversation with GBRA. Is that the -- did that phone conversation lead you to prepare what's been called the "white paper" for GBRA?

A A phone conversation?

Q Well, was it a personal conversation asking you to assess Tom's data?

A I can't remember. I don't remember referring to a phone conversation. It was a conversation with GBRA that led to the

preparation.
Q All right. So, GBRA contacted you. Do you recall whether it was by phone, e-mail, or were you already in another meeting with GBRA? Do you remember?
A It was by phone, I think; I do think.
Q Okay. So, with that phone conversation --
A Because that --
Q -- did that eventually lead to the white paper that you prepared for GBRA?
A Yes.
Q Okay. Was that white paper the very first time that you or anybody else had ever put in writing criticism of Tom Stehn's mortality counts?
A It was the first time I had. That's right.
Q And when you did that white paper, did you look to see if anybody else had ever criticized Tom Stehn's mortality counts?
A I was asked to evaluate the report, and, so, it --
THE COURT: Well, did you ask him why they wanted to evaluate it?
MR. KAHNE: I'm sorry?
THE COURT: Did you ask him why? Why they wanted to evaluate?
THE WITNESS: Well, it was a -- it was a large number of mortalities alleged, and we had worked there, so we were -- and I had worked there with the SAGES group, so it was a

logical outcome.

BY MR. KAHNE:

Q Are you aware that in December of 2009 TAP sent a notice of intent to sue actually TCEQ under the Endangered Species Act?

A I am not familiar with the timetable.

Q You're not familiar? But you're aware that there was a notice of intent sent.

A Yes, but when, I have no knowledge.

Q Okay. Were you at the time you had this meeting already on retainer as a litigation consultant for GBRA?

A Oh, boy. I -- I don't remember. I mean, I don't remember. I don't know the one date, and I don't know if it overlapped or not, but it may have been pretty close.

(Pause)

Q I have a question about Dr. Greer, and you had mentioned that she trained to look at whooping cranes at Aransas.

Do you know when she began her training?

A I believe, if I recall, she worked at the International Crane Foundation for a while, and then she -- I took her on as a graduate student, and we began preparing, because we were negotiating for the SAGES project, and she came on board in the fall of that year. And, so, we began thinking about the project and how she would be involved, so it was -- I guess she began training for it in the spring of 2003, the intense

training.
Q Now, you didn't do a lot of field work; we've already talked about that. Who trained her?
A Well, she spent time with Mr. Stehn. She spent time with me in the field. And she had worked with cranes before, and, so, she understood a little bit about behavior and was -- had had a master's degree working on waterfowl, so she knew wet environments and wetlands environments. And, so, she went to the refuge and set up shop and learned the hard way.
Q Isn't it true that she and Mr. Stehn didn't get along?
A Well, I hate to characterize relationships.
THE COURT: Well, pretend they're cranes.
THE WITNESS: Pardon?
(Laughter)
That might be a fair evaluation, at the end of her tenure as a graduate student.
BY MR. KAHNE:
Q I'm not in any way questioning that she got a lot of training from A&M or at the Crane Foundation. I'm trying to understand where she would have learned to form her -- I think I'm going to stop with that.
You talked about your time in the field with students. I think you mentioned that you went two to three days a year to see their work in the field.
A Two to three times per year --

Q Okay.
A -- that sometimes would be two to three days.
Q Okay. And, so, and focusing on the past 15 years, if -- I'm just trying to summarize some stuff we went through in the deposition -- the only students you had were you had one student in 2003, one student in 2004, and one in 2005. Is that right?
A I'm taking your word for it. Right.
Q Well, no; they're your students, sir.
A Well, do you have that exhibit that has the dates of their --
Q Sure. I don't know. What was the exhibit number?

MR. WAITES: This is for the defendant.

MR. KAHNE: Their exhibit; it's the list of students.

(Pause)

Let me do it another way. I don't need to do it that way.

BY MR. KAHNE:

Q In your deposition, page 85 --
A Uh-huh.
Q -- the question that was asked, you know -- let's see.

"Over the past ten years, how many days" -- this is starting on line 15.

"Over the past ten years, how many days in the field have you actually spent observing whooping cranes?"

A Uh-huh.
Q You asked -- you answered:
"The last how many years?"
MR. BLACKBURN: "Ten."
You said: "Ten years."
BLACKBURN: "Say, from 2000, you know, through the whole time of the SAGES study until today?"
And you said: "I would have to guesstimate. I don't know. I would say it's two to three days a year; two to three days a year for three, four, five; 2003, 2004, 2005, and I don't believe I was -- that's it."
And then:
BLACKBURN: "Okay. You haven't been in the field since 2005 during the winter?"
And you said: "Two thousand six."
So, focusing first on the period from 2003 to the present, is it right that you were there two to three days a year in the years 2003 --
A I would think -- and I can't tell you; I don't have records of when I went -- but I believe I was there on a couple of trips two to three days each winter.
Q Okay. And that was in 2003, 2004, and 2005, but not 2006 to the present.
A That's correct.
Q Okay. And then Mr. Blackburn asked you:

"Prior to 2003, have you been" --

MR. FERNANDES: I'm sorry, your Honor. Your Honor --

THE COURT: Sorry?

MR. FERNANDES: If they could give me those page numbers.

MR. KAHNE: I apologize. That's on page 86. I had meant to give you that.

THE COURT: Do you want one for the witness, Mr. Fernandes?

MR. FERNANDES: Please.

THE COURT: Do you have one?

(Pause)

THE WITNESS: Thank you.

BY MR. KAHNE:

Q So, sir, we're on page 86, at the top.

(Pause)

A Eighty-six?

Q Yes, sir.

A I run out of pages on 83.

Q Do you have the little square pages?

A Yes. I do.

Q Each of those is four pages that I'm looking at, so you have to look at the small copies, but --

A Oh.

Q -- they have numbers in the top --

A Oh, good grief.
Q -- up at the top right-hand corner of those --
A All right.
Q -- what we call Min-U-Script (phonetic).
A Thank you for that carmen guidance. Okay. Eighty-six.
Q Do you see at the top where it says, on line four:
"And prior to 2003 had you been in the field, say, between 1997 and 2003?"
And your answer was: "No."
A Okay.
Q And that's a fair --
A Yeah.
Q That's your best recollection, right?
A Right.
Q Okay. So, basically, from 1997 until the present, there were three years that you were in the field, 2003, four, and five, and you went two to three days a year.
A Well, two to three days each time I visited, which may have been a couple of times each year.
Q Oh, I see. Okay.
A So --
Q So, it would be somewhere between four and nine days a year for three years.
A Right.

Q Out of -- so, in the past 15 years, you've been there between 12 and 18 times, or maybe one visit per year, one day per year, for the past 15 years; that's your time there.
A Yes.
Q Okay. This morning you showed the judge what looked to me to be a pen when you described the feces from --
A Uh-huh.
Q -- the crane. Isn't that actually -- the description you gave; isn't that actually the description of the sandhill crane feces?
A No. Whooping crane.
Q Isn't the whooping crane feces more like a gel-like blob?
A No.

THE COURT: What are you talking about? Which exhibit?

MR. KAHNE: It was not an exhibit.

THE COURT: Okay. Just his testimony?

MR. KAHNE: It was his testimony.

THE WITNESS: I held this up.

THE COURT: So, it's shaped like that.

THE WITNESS: Yeah.

THE COURT: Okay.

Are you going to have a feces expert?

MR. KAHNE: There are some.

THE COURT: Okay. I'm sure.

BY MR. KAHNE:

Q I believe you testified this morning you don't have any doubt that whooping cranes actually drink water, right?

A That's correct.

Q But you had said that at least as of the time of your deposition you had never seen cranes drink. Have you seen it since then?

A No.

Q And the fact that you've never seen drinking is probably a reflection of the limited time that you have actually spent in Aransas looking at the cranes, right?

A That could be a reasonable assumption.

Q I don't recall; were you here when we saw the video of the cranes drinking fresh water the first day?

A No, I wasn't.

Q Would you like to see that?

A Oh, I -- I don't -- I mean, I accept the fact that they drink.

Q In your expert report, you stated -- isn't it true that you stated that there is anecdotal evidence describing occasional observation of cranes drinking water, but -- and for this you cited a paper from 1934 by Gordon -- you said that observation of birds holding their bill under the water may have nothing to do with drinking and may indicate some other behavior, such as foraging?

A Right.
Q And that, I think, I want to show; Plaintiff's 369, please. You're going to see the video.
A Okay.
(Began playing Plaintiff's Exhibit Number 369 video at 3:41 p.m.)
Q Do you see them swallowing?
A Uh-huh.
THE COURT: It looks like drinking to me.
MR. KAHNE: I think that's enough.
THE COURT: What do you think?
THE WITNESS: They're drinking.
THE COURT: Okay.
(Stopped playing Plaintiff's Exhibit Number 369 video at 3:42 p.m.)
BY MR. KAHNE:
Q Not confused with foraging, right?
A Right.
THE COURT: Oh, come on; move on.
BY MR. KAHNE:
Q Now, in your deposition you testified that you -- I'm looking at page 110 of your deposition.
A Uh-huh.
Q I'm looking at line -- the question began at line 15 and goes to line 18. And you testified -- I'm reading from line

17, quote:

"I don't believe they do much drinking of fresh water."

A Uh-huh.

Q You don't have any observational basis for reaching that conclusion, do you?

A No.

Q You don't have any studies that support that conclusion, do you?

A What I can say is my students didn't commonly refer to that behavior in their studies; Hunt, Chavez-Ramirez, and Greer.

Q They may have just taken it as routine if they saw it.

A Oh, could be, yeah.

Q But my question was: You don't have any studies that support that conclusion; it was just your belief at the time.

A Right.

Q If Dr. Chavez-Ramirez says that, in fact, whooping cranes do, in fact, drink a lot in the wild, you would accept that as true, wouldn't you?

A Yes, I would.

Q Now, you don't have any doubt that whooping cranes frequent the freshwater sources in the uplands when salinities are high in the marsh. They do, in fact, fly to the upland ponds.

A Ask me that again.
Q Do you have any doubt that whooping cranes frequent freshwater sources when salinities are high in the marsh; that is, they leave the marsh and fly to the upland ponds?
A What I do believe is that there is no scientific evidence for a threshold of 23 parts per thousand that triggers flights to the uplands to drink fresh water.
Q Okay. And I believe you testified to that this morning, but I have a different question.

Do you have any doubt that the whooping cranes, in fact, frequent freshwater sources when salinities are high in the marsh?

A Yes.
Q And what is --

THE COURT: You doubt or you agree?

MR. KAHNE: I'm sorry, Judge?

THE COURT: Did he say, "I doubt this," or do you agree with that?

THE WITNESS: I said, "Yes, I" -- the question was: "Do you doubt."

THE COURT: Yes.

MR. KAHNE: Yes.

BY MR. KAHNE:

Q And what is the basis for your doubt?
A The basis for my doubt is there are no scientific studies

that have evaluated a threshold of 23 parts per thousand as requiring -- that triggers drinking behavior or flight to the uplands to get to fresh water to drink.

THE COURT: But you told me this morning that at least by 30 they're going to have to go somewhere.

THE WITNESS: I told you what?

THE COURT: At least by 30 parts per thousand they're going to have to go somewhere.

THE WITNESS: Did I tell you that?

THE COURT: You did.

THE WITNESS: Oh. Okay.

THE COURT: You said they couldn't survive at 30 and that it would be pushing it. They certainly couldn't survive at 40 per thousand, and 30 would be pushing it.

THE WITNESS: Okay.

THE COURT: I told you these are all trick questions.

(Laughter)

MR. KAHNE: Except for mine.

THE COURT: Definitely.

BY MR. KAHNE:

Q I believe -- attended part of the trial, so I don't know whether you attended the part of the trial where Dr. Chavez-Ramirez testified that he had observed cranes frequently flying to the upland freshwater sources based on his personal observations when salinities were high in the marsh.

Did you hear that?
A No, I didn't.
Q Okay.
A But --
Q Go ahead.
A -- he did -- no. No, I didn't.
Q Okay. But if Dr. Chavez-Ramirez, in fact, testified that that's what he saw, you would believe him, wouldn't you?
A I would believe those anecdotal observations, but I would not believe that it triggers any foraging, flight -- I mean a flight to the uplands to drink fresh water. There is more to it than make that generalization.
THE COURT: What is -- what's more to it? Tell me.
THE WITNESS: Well, the -- in order to evaluate the relative -- the trigger thresholds for which cranes must fly to the uplands, in order to do that, one is going to have to have behavioral studies that look at the cranes in the field and a whole suite of salinities; not just at 23, but at 22, 20, 18, 15 --
THE COURT: I think Mr. Stehn testified to that, did salinities several times a week, and observed, observed when they left, over years.
THE WITNESS: Well --
THE COURT: Didn't he?
MR. KAHNE: That's my next question --

MS. UNIDENTIFIED: Chavez.

MR. KAHNE: -- whether he had heard him testify exactly what you said. Yes, your Honor.

THE WITNESS: I didn't hear any --

THE COURT: And Mr. Chavez. But -- I mean Dr. Chavez. But I remember Mr. Stehn talking about that.

MR. KAHNE: We're going to do both.

MR. FERNANDES: Judge --

MR. KAHNE: Let me help --

MR. FERNANDES: Oh.

MR. KAHNE: Let me see if I can clarify.

THE COURT: Sorry? Did I remember wrong?

MR. FERNANDES: Well, I just -- so this witness understands the testimony that I think I heard from him, from Mr. Stehn, he said they begin to fly, and I think that's consistent with Dr. Chavez-Ramirez, at 15 parts per thousand, and then they all have to go there at 23 parts per thousand. That's what --

MR. KAHNE: That's what I remember, too.

MR. MUNDY: That's where Chavez had the refractometer.

MR. KAHNE: That's what I remember too.

MR. UNIDENTIFIED: Okay.

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BY MR. KAHNE:

Q I'm trying to break it into two parts, Dr. Slack. The first part is the observation of a behavior, which is at some point when their salinities are high, and then I'm going to come to the quantification.

A "Salinities are high" is not a behavior.

Q I understand that. Thank you.

A Okay.

Q At some point, both Dr. Chavez-Ramirez and Mr. Stehn testified that they had observed, when salinities are high, at different -- as your counsel mentioned -- at different levels, but when salinities are high, they observed that the cranes fly to the freshwater uplands. And I understand you haven't seen that.

But my question to you is: Based on your knowledge of both men, over decades, do you have any reason to doubt that if they said they saw cranes flying in response to high salinities, you don't -- you do agree that that's what they observed?

A No.

Q No?

A I am a -- science is based on observation in controlled settings. And I know of no scientific studies -- I mean none -- that have a range of salinities and behavioral responses of cranes to those salinities. If it was 23 parts

per thousand, we would have almost 300 cranes lining up at watering holes drinking every day, and that doesn't occur.

So, I don't doubt that they have seen cranes at fresh water. I don't doubt that the fresh water -- the salinity levels in the marshes get to 23 parts per thousand. But I don't believe you can make the connection.

Q Okay. Let's -- let me talk about -- let me skip ahead here.

I guess you didn't see Dr. Chavez-Ramirez explain the use of a refractometer.

A No.

Q Okay.

A But I'm sure he can do it. Yes.

Q You do know what a refractometer is.

A Yes. Uh-huh.

Q And have you also used that device in other studies, in any event?

A Yes.

Q And it's really simple to use, isn't it?

A That's -- yes.

Q Okay.

A Well, I'm not going to say it's simple to use, because Dr. Chavez-Ramirez can use it. Yes.

Q All right. And you don't doubt that Mr. Stehn can use it as well.

A I have no question.
Q All right. And, in fact, you know that Mr. Stehn has been collecting longitudinal data of salinities for decades.
A Uh-huh.
Q I'm correct, right?
A I'm -- I know he collects data at the boat ramp when he goes out, and I -- but he didn't go out every day.
Q Okay. And you're aware that, in fact, field workers, field researchers, routinely take salinity measurements because it's so widely known to be relevant to the ecology of estuaries.
A It's an important feature of an estuary. That's correct.
Q Okay. Now, both Dr. Chavez-Ramirez and Mr. Stehn testified that, based on their gathering of data using that refractometer to measure the salinities --
A Uh-huh.
Q -- they observed that when the salinity is, as Mr. Fernandes said -- I'll start with -- see if I've got it right -- Stehn said 15, I think, and Chavez-Ramirez said at 18, but starting at somewhere between 15 and 18 and moving up to 23, when the salinities got in that range, that's when they started to see the cranes leaving their territories and flying to the freshwater sources in the uplands. Okay.
And my question is: If they testified to that, having done the observation of the salinity and observing the

flight to the uplands, do you have any reason to doubt that they accurately recorded their observations?

A You would not get those observations published in a peer-reviewed journal of scientists who are expecting the scientific method to be used, with hypotheses. And those hypotheses would vary along the range of those salinities. I'm just saying that it's a stretch to go from salinity to birds flying and, therefore, they're connected.

Q Well, that wasn't my question.

THE COURT: Move on.

MR. KAHNE: Although I -- my question --

THE COURT: I've got it.

MR. KAHNE: You've got it. I'm done.

THE COURT: Move on.

BY MR. KAHNE:

Q Are you familiar with the first refuge manager as being a Mr. Stevenson? Do you know that? He published one of the papers on --

A I'm not that old. Yes, but --

Q Well --

A Yes, I am familiar with Stevenson. Correct.

Q And Stevenson wrote a paper in, I think it was 1943, where he said whooping cranes crave -- this is my representation -- whooping cranes crave fresh water and during bad winters drank fresh water twice a day.

Are you familiar with that paper?
A Gosh; I know I've read it, published in Auk or Condor or something like that.
Q Okay. So, is that a fair characterization of one part of that paper? I realize that that's --
A I don't know. I mean, I can't remember what Steven --
Q You don't remember that detail.
A No, no.
Q All right.
THE COURT: Is that a published study?
THE WITNESS: Yes; in the fifties, 1950's or --
THE COURT: Forty-three.
THE WITNESS: Forty-three? Yeah. Yes.
THE COURT: Okay. So, you didn't do a review of the literature when you did your deposition that you didn't know anything about freshwater drinking?
THE WITNESS: Not that --
THE COURT: Apparently not.
THE WITNESS: No, I did not look at Stevenson.
THE COURT: Okay.
THE WITNESS: Right.
BY MR. KAHNE:
Q Hunt's paper in 1987; was that his thesis? I hope it is the Howard you mentioned.
A The paper in 1987 would be a dissertation. Right.

Q And that dissertation was done under your supervision, right?
A That's correct. Uh-huh.
Q And isn't it true that, as part of that thesis, Hunt actually measured the distance that cranes fly to drink?
A I believe that's correct.
Q Have you ever discussed with Dr. Chavez-Ramirez how he routinely takes advantage of the cranes' behavior that they fly to freshwater ponds so that he can trap them there for banding and other purposes?
A No, I have not talked to him about banding.
Q Have you ever talked with him about the fact that he routinely takes advantage of this behavior of cranes that they are known to fly to freshwater ponds?
A I have not; we have not spoken about that, but I -- I -- and it's also near those freshwater ponds where I have been in 2008-2009 where the supplemental feeding stations were.
Q Yes. I was not restricting my questions to 2008 --
A Okay. All right.

THE COURT: And his dissertation was 1987? Is that right?

MR. KAHNE: I'm sorry; Hunt?

THE COURT: Hunt.

MR. KAHNE: Was 1987, correct.

THE COURT: Okay. That's what I thought.

MR. KAHNE: Now --

(Pause; Mr. Kahne and Mr. Waites confer off the record)

BY MR. KAHNE:

Q You mentioned that a number of -- you testified earlier a number of your students have done dissertations on topics other than whooping cranes in the endangered species area.

A That's correct.

Q And you mentioned -- I just took a quick glance at that, and I noticed that one of the most recent ones was on a different crane -- endangered cranes species, right?

A Yes.

Q And I don't know this, whether you have familiarity with other crane species yourself from your work over the years.

A I know fleetingly about Siberian cranes through that student, but, no, I am not an international conservation person.

Q You wrote in your expert report, and I quote -- is this an accurate -- do you recall making this statement? Quote:

"Whooping cranes have well-developed supraorbital salt glands which rid the body of excess salt, thus making them capable of surviving in a salt marsh environment like many other marine-adapted species."

Do you recall that?

THE COURT: When was that? When did he write that?

MR. KAHNE: It's in his expert report.

THE WITNESS: It's in the --

THE COURT: This is the one that he filed with this Court?

MR. KAHNE: He -- it's --

THE COURT: I thought it was the other one.

MR. KAHNE: It should -- I think they did file it as an attachment with something, yes.

THE COURT: It was.

MR. KAHNE: But I didn't -- it's not introduced.

THE WITNESS: Which --

THE COURT: No, I know, but -- I've got it.

MR. KAHNE: You should have it. Yes, your Honor.

THE COURT: I do. I've read it.

MR. KAHNE: Okay.

THE WITNESS: Which --

THE COURT: I thought it was the other, the veterinary guy that talked about that.

MR. KAHNE: He did, but this --

THE COURT: In his report.

MR. KAHNE: He did. Both of them have talked about it.

THE WITNESS: Which one is this? Where did you say that was, sir?

MR. KAHNE: In your expert report.

THE WITNESS: All right.

BY MR. KAHNE:

Q Is it -- let me start with this. Is it your belief --

THE COURT: It was filed, like -- it was, like, in August or something, I think.

MR. KAHNE: Yeah.

THE WITNESS: Uh-huh. Right.

THE COURT: Okay.

MR. KAHNE: I don't recall the date, your Honor. I'm sorry.

Is it your --

THE COURT: The 9th. I don't know. Okay.

(Laughter)

MR. KAHNE: That may be right.

BY MR. KAHNE:

Q Is it your understanding that whooping cranes, the ones that we have here in Aransas --

A Uh-huh.

Q -- or at the refuge -- have well-developed supraorbital salt glands which rid the body of excess salt, thus making them capable of surviving in a salt marsh environment, like many other marine-adapted species?

A That was my understanding.

THE COURT: Where did you get that?

THE WITNESS: I don't know.

THE COURT: You just made it up?

THE WITNESS: Yeah, I just made it up.

THE COURT: I'm afraid so, too.

(Laughter)

THE COURT: Okay. Moving along.

THE WITNESS: Can I see that? Can I -- I mean, I don't know. I heard the testimony this morning.

MR. KAHNE: Well --

THE COURT: Well, the veterinarian said that, too, but it turned out he didn't know either.

MR. KAHNE: Okay. And --

THE WITNESS: Okay.

(Laughter)

BY MR. KAHNE:

Q And what I'd like to -- isn't it true -- you didn't give any citation, by the way, in your report.

A Okay.

Q And I think you just told the judge you're not aware of any published literature that says that they have well-developed supraorbital salt --

THE COURT: Because when that report -- I'll tell you, when the report was filed, in fact, I said, "What is this, a natural desalinization plan?" So, I looked it up, and there wasn't anybody that ever described any such thing on a whooping crane. So --

MR. KAHNE: That's correct.

THE WITNESS: Okay.

THE COURT: -- I had to look it up. Sorry.

THE WITNESS: I accept.

MR. KAHNE: There's one; if you'll put up 383, please.

THE COURT: I thought we could put them to work.

(Laughter)

BY MR. KAHNE:

Q Three-eight-three, which you should be able to see there, is a publication by the International Crane Foundation, and it is a -- actually, a publication on "brolga" -- B-R-O-L-G-A -- cranes. Just in case your Honor wants to note it, they have greenish-gray skin, and they --

THE COURT: They've got gangrene.

(Laughter)

MR. KAHNE: And --

THE COURT: I'm sorry. I can't seem to move on.

(Laughter)

BY MR. KAHNE:

Q And they occur in both northern and eastern Australia, and I'm not going to read all of it, but the point about this report is that it reports that the brolga crane --

A Uh-huh.

Q -- and it's a unique feature of the brolga crane -- is they have well-developed salt glands.

A Okay.
Q Do you have any reason to doubt this report?
A It's from the International Crane Foundation?
Q Correct.
A No.
Q Okay. There are comparable reports from -- for the whooping crane. It doesn't have them.

As we sit here --

THE COURT: Well, I don't know that. I just know that I couldn't find anybody that had ever reported them.

MR. KAHNE: Uh-huh. It's not reported.

BY MR. KAHNE:

Q Let me ask you this. As we sit here today, notwithstanding whatever you may have written in your expert report, isn't it true that you have no basis for stating that there are functional salt glands in the whooping crane?
A Yes.
Q Isn't it true that for birds -- there are other birds that have salt glands, right? Not just --
A Sure.
Q -- the brolga crane, right? And isn't it true that when those salt glands function you actually get a secretion from the salt gland where the salty pus, if you will, drains down from the nares?
A That's what I understand.

Q Okay. Have you ever seen that?
A No.
Q Okay. You've never seen or heard of that being reported for whooping cranes, right?
A The drainage?
Q Anything relating to salt glands of the whooping crane.
A No. I think I've answered that. Right.
Q Okay. Now, without having salt glands, isn't it your understanding that, since the cranes do drink water, there is a point at which they need to stop drinking salt water and instead shift to what we would call sweeter, or less salty water?
A I would --

THE COURT: I don't think he knows anything about that.

THE WITNESS: Right.

THE COURT: Okay. So, I mean, you've established that.

(Laughter)

So, don't rub it in.

(Laughter)

Move on.

MR. KAHNE: Your Honor, he's trying to say that the cranes don't need water, and there is --

THE COURT: He can't say that.

MR. KAHNE: Okay. Very good.

THE COURT: Move on. I mean, it's me you're talking to, right?

MR. KAHNE: It is.

THE COURT: Okay.

THE WITNESS: Now, I am saying that there are no scientific studies.

THE COURT: That say at what point they have to have the fresh water.

THE WITNESS: Right.

THE COURT: I understand that.

THE WITNESS: That's correct. Yes.

THE COURT: But where I understand him to be is that he accepts the representations --

MR. KAHNE: I heard you.

THE COURT: -- of Dr. Chavez-Ramirez and Mr. Stehn that whooping cranes drink fresh water. So, one would assume from that that they need it at some point.

MR. KAHNE: I'm going to blue crabs.

THE COURT: Thank you.

BY MR. KAHNE:

Q You would agree that blue crabs are an important part of whooping crane diet. Let's put up -- the judge will remember Plaintiff's Exhibit 42.

Robert Porter Allen.

MR. WAITES: I'm sorry; page 42?

MR. KAHNE: It's -- no. I don't know what exhibit he is. It's the next book.

MR. MUNDY: Three seven two. It's right up here if you need it.

May I take that to him?

THE COURT: Please.

MR. KAHNE: Page one --

THE COURT: Is that Report Number 3? Is that what that is?

MR. KAHNE: It is.

MR. MUNDY: It is.

THE COURT: Audubon Report Number 3, 1952? Okay.

MR. MUNDY: Ivory-billed woodpecker and roseate spoonbill were one and two.

THE COURT: Okay. No, the reason -- I was looking it up on AVE.books, which is where you get old books, and that's what it kept coming up as, Report Number 3.

MR. MUNDY: That's exactly what it is.

THE COURT: I was trying to help you find another book.

MR. MUNDY: We have replacements. I had it at lunch and forgot to bring it, but tomorrow we'll have the replacement copy.

MR. FERNANDES: We've had a copy here --

MR. KAHNE: Can you put up --

MR. FERNANDES: -- for six days that you're free to copy.

MR. KAHNE: -- page 112?

MR. MUNDY: One twelve? One twelve?

THE COURT: And that's, what, 172? What did you say that was?

MR. UNIDENTIFIED: Three seven two.

THE COURT: Three seven two?

MR. KAHNE: Three seven two.

THE COURT: Thank you.

(Pause)

THE COURT: So, you can zoom in.

MR. KAHNE: That would be better.

THE COURT: You can zoom in. Do you need some help?

MR. KAHNE: I do. Please.

THE COURT: Ms. Gano, would you help him?

MR. MUNDY: I can help him, your Honor.

MR. KAHNE: Oh.

BY MR. KAHNE:

Q Robert Porter Allen; you testified he was a great scientist and friend of the cranes, right?

A That's correct.

Q And --

A That is correct.

THE COURT: His hero. His hero, he said.

MR. KAHNE: His hero. Yes.

Your Honor, I have to apologize. I'm a little bit hard of hearing, so if I appear not to have heard you, sometimes, at least, it's due to that.

THE COURT: I'm used to it at home. Go ahead.

(Laughter)

BY MR. KAHNE:

Q I just want to direct your attention to what is Table N in Plaintiff's Exhibit 372. And you see right up at the top your hero, Dr. Allen -- was he a doctor? Robert Porter Allen identified blue crab as it was two to three times as important as any other food item in terms of the numbers of food found in samples; it was at the top in terms of percentage occurrence in all of the samples, et cetera --

A Okay.

Q -- going across it. Right?

A Right.

Q Isn't it true that, until we get to Dr. Greer, all of the research, including research of your own, asserts or finds or reports the paramount importance -- I'm not saying they don't eat -- let me back up. I am not saying that the cranes don't eat other things. It is crystal clear that they do. All literature reports that.

But isn't it true that, up until the time of

Dr. Greer, all of the research recognizes that blue crab is of paramount importance to the diet of the whooping crane at Aransas?

(Pause)

A I --

THE COURT: Are you uncomfortable with that?

THE WITNESS: I am uncomfortable with that --

THE COURT: Okay.

THE WITNESS: -- saying "all." I mean, can you --

THE COURT: It's hard sometimes to boot up all your past information and come out with an answer like that immediately.

THE WITNESS: Uh-huh.

THE COURT: I can tell you what I've seen. From what I've seen, is that everybody up until -- what I've seen -- because I haven't reviewed the literature like you have.

THE WITNESS: Uh-huh.

THE COURT: It looks like what he is saying is correct; that everyone has talked about how important the blue crab is to the diet of the whooping crane until Dr. Greer's study minimalized the importance of the blue crab.

THE WITNESS: Howard Hunt's --

THE COURT: Or minimized.

THE WITNESS: -- study in one year found blue crabs were not as critical as the other year. So, it is -- and I

think Felipe Chavez-Ramirez in one of his publications found on Matagorda Island in one year clams were more important than crabs. So, it is --

THE COURT: It appears to be in years cyclical.

THE WITNESS: That's correct.

THE COURT: But everybody has concluded that they are a major source, a food source, and a very important source.

THE WITNESS: They are an important source. But I am uncomfortable -- I am uncomfortable giving them the status --

THE COURT: I agree with you.

THE WITNESS: -- of "all" important.

THE COURT: I don't think you -- I'll help you here. You don't need to answer that.

THE WITNESS: Good.

BY KAHNE:

Q Shortly we're going to come to a paper that you did with Mr. -- with then, I guess, Mr., and now Dr. Hunt, that found blue crabs to be an important part of the diet.

A Sure.

Q And I just had a question about that.

How did you -- you went through --

A Can I see the publication?

Q Yeah. Sure. You can see the publication. You testified about it this morning.

THE COURT: Which publication, again?

MR. KAHNE: This is the Hunt and Slack, 1989. It's the publication --

THE WITNESS: Oh, okay.

MR. KAHNE: -- when you talk about grouping the data.

THE WITNESS: Right.

MR. KAHNE: Do you recall that?

THE WITNESS: Right.

BY MR. KAHNE:

Q Okay. And how did you say you grouped that data? Why did you say you chose the groupings that you did for the month periods?

A Well, it was one of those decisions we made, that -- it was so startling to us to see that crabs were not important in each month, that we said we must be making a mistake. And, so, we grouped the data, and it showed that the crabs were important, and we felt more comfortable. It's not proud of that, but that's --

Q That's not what it said --

THE COURT: Did you want -- did you want him to have that study in front of him, Mr. Fernandes? It is your witness.

MR. KAHNE: Well, he's about to see the study.

THE COURT: Well, show it to him.

MR. KAHNE: Okay. Yeah.

THE COURT: Is that all right?

MR. FERNANDES: Yes. Absolutely.

BY MR. KAHNE:

Q You can see this -- do we have an exhibit number for this yet? Slack 17? Plaintiff's Exhibit 206.

In the paper --

A Okay.

Q In the paper, doesn't it describe how and why you chose to group your data?

A Okay. Where do you want me to look?

Q I'm sorry?

A Where do you want me to look?

Q I don't have the page. I apologize for that. But it should be, I think, in the "Methods" section.

A Uh-huh. So, you're in "Methods." Okay.

(Pause; Mr. Kahne and Mr. Waites confer off the record)

BY MR. KAHNE:

Q Isn't it true that the reason -- the way you grouped data had to do with when Fish and Wildlife did their burns? They did two periods of burning; and isn't it true that you grouped -- the first set of data was what came before the first burn; the second set of data was what came between the burns; and the third set of data was what came after the burns?

A I must tell you that the decisions we made back in 1989 -- I mean, I'm -- I remember the scenario as I told you, because I've used it with graduate students, in terms of the scientific method and presenting data. I may have -- we may have also

conveniently fell into the burn schedule, too. I mean, I --

MR. KAHNE: There it is. It's been found. I don't -- can you give me a page reference just so we can put it in the record?

MR. UNIDENTIFIED: Second page of the article.

MR. KAHNE: It's the second page of the article, looks to be just above "results."

THE WITNESS: Yes.

MR. KAHNE: Two paragraphs.

THE WITNESS: I see that.

MR. KAHNE: You see that?

THE WITNESS: Uh-huh.

MR. KAHNE: Okay.

May I approach just -- Well, keep that paper up there for a moment, actually.

BY MR. KAHNE:

Q All right. Now, let's talk about Plaintiff's Exhibit 207 --

A Uh-huh.

Q -- which has to do with the low -- let's see. Let's look at Plaintiff's -- these are a couple of studies that have talked about the linkage between the -- between blue crabs and increased whooping crane mortality. And the first of these is a paper, Plaintiff's 207, which is published by Nelson, yourself, and Gee --

A Yes.
Q -- called "Nutritional Value of Winter Foods for Whooping Cranes."
A Okay.
Q And that was published in the Wilson Bulletin, which is a peer-reviewed journal, right?
A Yes. Yes.
Q And in that paper you measured the metabolizable energy and digestibility of whooping crane winter foods, and you included for that blue crab, rangia crab -- excuse me -- blue crab, rangia clam, wolfberry, and acorns, right?
A Yes.
Q And you also looked at stout razor clams, right?
A Yes.
Q Okay. And if you look at page 735.

Can you bring that up from that exhibit? And can you highlight the -- zoom in on the part at the top. Nope.

MR. UNIDENTIFIED: Sorry.

MR. KAHNE: That part's good, but I wanted the chart.

BY MR. KAHNE:
Q Can you see that?
A Yes. I can.
Q Okay. And, so, for blue crab -- that's the one in the middle there --
A Uh-huh.

Q -- isn't it true that the crude protein as measured by grams per kilogram of diet was by far the largest at 315 grams per kilogram?
A That's correct.
Q And the second largest was wolfberry.
A Wolfberry. You're right.
Q And you've already testified that those are gone by --
A Late December.
Q Sometime in December. Okay.
A Uh-huh.
Q And, then, there is also the stout razor clam. There aren't that many; that's not a very abundant food, isn't that right, in this particular habitat?
A Right.
Q Okay. So, at least of the foods you studied, and at least for the period after December, the blue crab is far and away the most important source of protein, right?
A Yes.
Q Okay. Now, in terms of metabolizable energy, we give the award to the wolfberry fruit, if that's -- that may be why they go there and they chow down. It's --
A Could be.
Q -- a good sugar hit, right?
A Ice cream. Ice cream. That's correct.
Q Ice cream. Okay.

THE COURT: And what year was this? Eighty-nine?

MR. KAHNE: Ninety-six.

THE COURT: Okay. This is the Wilson Bulletin report?

MR. KAHNE: It is.

THE WITNESS: Yes.

THE COURT: Okay.

MR. KAHNE: It's called, "Nutritional Value" --

THE COURT: "Value of Winter Foods for Whooping Cranes."

MR. KAHNE: Yep.

THE WITNESS: Uh-huh.

BY MR. KAHNE:

Q Live oak acorn isn't always very much available, is it --

A That's correct.

Q -- in that habitat?

A That's correct.

Q So --

A It becomes available when they burn.

Q Right.

A Uh-huh.

Q Which is episodic, and it's upland.

A Uh-huh.

THE COURT: The bottom line was crude protein was two times -- two to three times higher for the blue crab than for

the wolfberry and the stout razor clam.

MR. KAHNE: All right. Now, let's --

THE COURT: And the wolfberry was high for metabolic energy and lipid nutrient, right?

(No audible response)

You have to answer out loud. I'm sorry.

THE WITNESS: Yes.

THE COURT: Thank you.

BY MR. KAHNE:

Q Now, let's look at -- now let's look at the bottom of 735, highlighted language. This was one of the conclusions from your report, right? And I don't know if we can do this, can we then continue on, but:

"Blue crab and stout razor clam provide three to five times more digestible crude protein than wolfberry and acorns and a larger per-unit capture."

So, at least if you get a good one, you get a good one. But,

"They're less localized and they require greater time for search and" -- the last word is going to be "processing."

A That's correct.

Q That was one of the conclusions of your paper, right?

A Uh-huh.

Q And then there was an additional conclusion, and this is

on page nine -- excuse me -- 736, and it's the one that begins, "Under some circumstances," the first sentence in that paragraph. And you concluded:

"Under some --

THE COURT: Some conditions.

MR. KAHNE:

-- "some conditions of food availability, whooping cranes on the ANWR" -- meaning the refuge -- "may have difficulty in meeting maintenance requirements and building energy reserves needed for spring migration."

Right?

A Yes.

Q And let's look at another conclusion, immediately below it:

"Foods that may have been less available during the fall and winter of '93-'94 because acorn and" -- excuse me. I'll restate that.

This is another of your conclusions:

"Foods may have been less available during the fall and winter of '93-'94 because acorns and blue crabs were not common, although the wolfberry was abundant until January."

A Okay.

Q Isn't it true that, when originally published, you and

your co-authors intended these statements to mean that a problem for the diet of the cranes exists when blue crabs and acorns are not available?

A You can see the beginnings of the thinking regarding optimal foraging and the differences of value of one food item over another in this commentary.

Q That was not my question.

A And that's where we were --

Q Dr. Slack, I have a very specific question.

MR. FERNANDES: Your Honor --

THE COURT: Wait a minute. Wait a minute.

MR. FERNANDES: If he could be permitted to finish his answer.

THE COURT: You may. Even if you don't like it and if it's not the right answer.

MR. KAHNE: I apologize.

THE COURT: Finish answering.

THE WITNESS: And in that, we made the comparison that there was a difference in energetic value and proteins of these food items. And that became part and parcel of the thinking for our SAGES study, and it became an understanding to us of how we get this variety. This is a top-level carnivore in a trophic system that has to be capable of switching from one food item to another, and that top-level carnivore does that switching based on energetic value and efficiencies of the

processing of variability of the work entailed in capturing. And, so, all of those are going to play a role.

BY MR. KAHNE:

Q Now, I'll repeat my question to you.

A Okay.

Q Isn't it true that when you published that, those conclusions that we've just looked at --

A Uh-huh.

Q -- the authors originally intended this to mean that a problem exists, in terms of the dietary problem, when blue crabs and wolf -- excuse me -- blue crabs and acorns are not available? Wasn't that the original intent?

A I don't think we ever felt that acorns were a big deal.

Q Good.

A But we always knew that blue crabs were important. I have never denied that blue crabs are -- they are important to the crane.

Q All right. Now, I'm going to direct your attention, then, to your deposition.

Do you still have a copy of it up there?

A Yes.

Q Page 100. Again, it's in the little pages; page 100.

A Yes.

Q Looking at line 12, Mr. Blackburn's question begins:

"The implication of that sentence, to me, is that

acorns and blue crabs not being available was a problem."

And he asked, "Do you agree?" and you said, "No."

And then he asked:

"Do you agree that was the intent when this sentence was written?"

And then you said, "Yes."

Right?

A Uh-huh. Uh-huh.

Q So, at the time you wrote that paper in 1996 -- however things may have evolved since then -- at the time you wrote the paper in 1996, published it, peer-reviewed journal, the intent of the authors was to recognize that the lack of blue crab posed a dietary problem for the whooping crane.

Isn't that true?

A Yes, but science advances. Science is not static. And we may have a conclusion in one study at one time, but as we move forward and advance our knowledge of an ecosystem, that's going to change. And, so, I may be guilty of moving forward in science and changing my conclusions.

Q Look at page 736, please.

A What are you talking about?

Q Oh, on the same exhibit; I'm sorry. Not your deposition.

A Good.

Q Page 736. And it's the part: "It is possible, however."

(Pause; voices and whispers off the record)

That's it, right there. Good. Five lines from the paragraph that begins: "Multiple factors."

A Uh-huh.

Q This was a conclusion from your paper; am I correct?

"It is possible, however, as indicated by the high over-winter mortality for 1993 to '94, the late spring migration, the lower numbers of returning whooping cranes, and low numbers of pairs that nested in 1994" -- now, here is the critical part -- "that food shortage on the ANWR was a contributing factor to low reproduction and high whooping crane mortality for later fall of 1993 to fall of 1994."

Am I correct that was a conclusion that you reached in that paper at that time, regardless of how it may have changed later?

A And it's headed with, "It is possible."

Q Yes? Okay.

A Right.

Q And, so, isn't it true -- let me ask you first:

The high whooping crane mortality; you got that by using and relying on Tom Stehn's mortality data, right?

A We got it from Tom Stehn.

Q Okay. And you characterized in your paper that whooping crane mortality from 1993 to 1994 as being high, that was not

an incidental point of the paper; that was an important point of that paper, right?

A Well, it -- yes.

Q So, at the time -- let's see -- your paper at least suggested that low blue crab availability contributes to cause high mortality.

A Yes. But you must know, while this was going on, Felipe Chavez-Ramirez was gearing up to do his research. And there has always been a -- there has always been a tendency of my graduate students to want to identify a silver bullet as explaining how an ecosystem operates. And this silver bullet seemed to us at that time -- high mortality, and if someone at the refuge says there is low food abundance, gosh, maybe they're tied. But after our SAGES research, one, the documentation of low food abundance is not there; and, two, the tie to mortality is not there.

And, as a result, we have never been able to really tie the wintering grounds and the actions on the wintering grounds with breeding of whooping cranes. And making that tie is kind of the, I don't know, what biologists would love to make in migratory species, that what happens on the wintering grounds affects the breeding grounds. And it's very, very difficult to do; in fact, hardly ever been done.

Q And, in fact, I am not asking you about the breeding grounds at all at the moment. And I --

A Well, but that's --
Q I might need a --
A -- part of this quote.
Q I understand that.
A So, I assumed you were asking me part of that, too.
Q I do understand that. But I am asking you about the high whooping crane mortality part of the quote, and my only --
A Oh.
Q -- two points that I wanted to confirm, and I think you did, was that at the time you recognized that the 1993-94 winter was high mortality; right? Yes? You have to --
A It was. As indicated, right.
Q Yeah. And to get that, you relied on Mr. Stehn's data, right? That was the only data you had?
A That's the only data we had.
Q And your paper at least suggested that low blue crab availability contributed to that mortality.

And I think you said "yes" to that as well, right?

A Right; and delayed spring migration, and --
Q Okay. Suggested a number of things that were possible.
A Right.
Q Right. Okay.

Now, Dr. Chavez-Ramirez published his thesis at approximately the same time as this particular paper came out, right?

A Uh-huh.
Q And you recall that --
(Pause; voices and whispers off the record)
One moment, your Honor.
THE COURT: Yes, sir.
(Pause)
BY MR. KAHNE:
Q In Dr. Chavez-Ramirez's thesis, he had looked at two different years on the refuge, right?
A Yeah.
Q Correct?
A Yes.
Q For the record, "yes" and "no" -- unfortunately.
A Yes.
Q And one of those years was a good year and one of those years was a bad year, in terms of crane mortality, right?
A That is correct.
Q Okay. And that thesis was -- that determination of mortality was made using Tom Stehn's numbers, mortality numbers, right?
A That is correct.
Q The first year was '92-'93. That was the good year. And the bad year was also '93-'94, right?
A I -- if you say so, right.
Q Okay. Well, that's -- I believe that's right.

But the point of the paper was one was a good year for the cranes --

A Uh-huh.

Q -- one was a bad year for the cranes, and that was also related to the foods that they ate. Right?

A There is no evidence that it was related to the foods. They happened to occur in time, contemporaneously.

(Pause; voices and whispers off the record)

Q I'm not suggesting to you that one study proves a correlation, but isn't it true that in the good year, as shown by Dr. -- the good year for the cranes; fewer deaths -- there was more blue crab bioavailability for them, and in the bad year there was less?

A I will accept your comments, but I don't -- there is no tie between them. There is -- there was no evidence of a tie at that time.

Q Isn't it true that -- let me just make sure I understand this.

You said at one point you were suggesting -- this is your own paper in '96 -- you were suggesting the possibility --

A Uh-huh.

Q -- that the lack of blue crabs contributed to high mortality, and then you said your opinion has changed; and you said --

A That's correct.

Q -- and you said it changed based on the work of SAGES.
A That's correct.
Q And by that you mean, in terms of that tie, it's all about Dr. Greer's research, right? No other research in SAGES concerns this issue.
A Well, there's Dr. Davis's work on wolfberries. It is certainly germane.
Q Okay. Very good.
A And Dr. Greer's work on availability of foods, as well as on foraging behavior, correct.
Q Right. But -- okay. So, Dr. Davis's work on wolfberries --
A Uh-huh.
Q -- largely supports what everybody else agrees, that the cranes benefit a whole lot when there are a lot of wolfberries, and when there aren't a lot of wolfberries, it's harder for them, right?
A Well, when there are not a lot of wolfberries, they switch.
Q Well, don't all animals switch? I mean, if they can eat something, they will try to eat something else, right?
A That is correct.
Q Okay. But there are -- you talked earlier about them making a cost-benefit analysis from the crane's perspective -- and presumably they know better than you or I -- if they got a

choice of wolfberry, in October, November, and early December, that's what they go for. That's what they think is the best food for them, right?

A I can't -- I have a hard enough time with my own decision-making, let alone put myself in a crane's view. What --

Q You said -- I didn't make that up.

A Yeah. They -- well, okay. Go ahead. Where were you going with this?

Q From the time of your publication in 1996 --

A Uh-huh.

Q -- which suggested the possibility of a connection between blue crabs and crane mortality, until the present, the only other study that changed your mind is Dr. Greer's research in SAGES.

A That is correct.

Q Okay. Now, before we get to Dr. Greer's research, I want to show you a different paper, which is Plaintiff's Exhibit 204.

(Pause)

And this is going to be a paper that is titled: "A Low Intensity Sampling Method for Assessing Blue Crab Abundance at the Refuge and Preliminary Results on the Relationship of Blue Crab Abundance to Whooping Crane Winter Mortality."

Do you read that paper?

A Yes.

Q Okay. That paper is -- the primary author is -- I hope I'm saying his name right -- Pugesek.
A Okay.
Q Is that right?
A Okay. Uh-huh.
Q Is that -- well, I hope so. And Tom Stehn is also a co-author on that paper, right?
A That's correct.
Q All right. You're not an author.
A That's correct.
Q Fair to say that --

THE COURT: What year was this?

MR. KAHNE: I'm sorry?

THE COURT: What year?

MR. KAHNE: I have it as 2006; fairly recent paper.

MR. WAITES: Two thousand eight.

MR. KAHNE: Excuse me? Two thousand nine?

THE COURT: Eight.

MR. WAITES: Eight.

MR. KAHNE: Two thousand eight. I have a typo in my outline.

THE COURT: And the number of -- the exhibit number is?

MR. KAHNE: Two zero four.

THE COURT: Thank you.

BY MR. KAHNE:

Q And you looked at this paper with Mr. Blackburn in the deposition as well, right?

A That's correct.

Q Okay. Bruce Pugesek is a highly-regarded research scientist with the USGS, right?

A He's with the USGS, right.

Q And he's a highly-regarded research scientist, isn't he?

A Sure; probably is. I don't know him.

Q You don't know?

A No.

Q Oh. Okay.

The USGS; that's the same organization that has the National Wildlife Health Center that we saw this morning with Dr. Stroud, right?

A Uh-huh.

Q It's certainly a reputable organization --

A Sure.

Q -- he's with, right?

A Yeah.

Q Okay. Do you know the USGS National Wetlands Center to be the top USGS research center for wetlands?

A Yes; it's very -- it's a sound place. Right.

Q Do you recall that for this paper the authors sampled blue crabs for the period of 1997 to 2005?

A Okay.
Q And do you recall that they did the sampling of blue crabs two different ways?
A Okay.
Q Is that a "yes," you are aware of that?
A I am aware I read it, but I did not -- I don't have it memorized, the paper.
Q All right. And one of the ways that they measured blue crabs was with intensive surveys and trapping.
A Yes.
Q And the other way that they mentioned blue crabs was they looked at Tom Stehn's data when he did his transect-based surveys of blue crabs, right?
A Yes.
Q And isn't one of the findings of this paper that there is a very strong correlation between Tom Stehn's surveys of blue crabs and the much more intensive surveys that they did that Mr. Baldwin was in charge of?
A There was correlation. That's correct.
Q And, in fact, wasn't the -- this was the -- just, if you'll lower that just a little bit so we can see the title again.

The whole point, or one of the points, excuse me, of this paper was a low-intensity -- was to assess Tom Stehn's low-intensity sampling method to assess blue crab abundance,

right?
A The relationship of blue crab abundance to whooping crane winter mortality.
Q Well, that was also a purpose.
A Uh-huh
Q But one of the -- do you see how the first part talks about a low-intensity sampling method and one of the findings of the paper was that, as reported in the paper, was that Tom Stehn's data provided a good index to measure crabs in the marsh?
A Okay.
Q Do you understand that that's in the paper?
A Yes.
Q Okay. And, then, a second part of this paper, they looked at crane mortality, and they found -- isn't it true that one of the conclusions of this paper -- that mortality among adult cranes was inversely related to blue crab abundance; that is, fewer blue crabs means more crane deaths?
A If I recall the paper correct, it says fewer blue crabs in March is related to mortality in the remainder of the year.
Q That's a finer point on it than I put.
A Well, but that's a big deal.
Q And why would that be a big deal?
A Well, how would you -- what biologically is there about a value in March for something that occurs in November?

Q What do you mean "that occurs in November"? The crabs have to be there --
A The mortality in November; no mortality in December; mortality in February; all of which occurs before the March data on crab numbers are taken. It may be a correlation, but it makes no sense biologically.
Q Look at Dr. Greer's data.
A Okay.
Q Shortly you're going to see -- we're going to criticize Dr. Greer's research.
A Okay.
Q But before I do that, I guess what I'd like to show you is DX-224.
(Pause)
Two winters there, right?
A Yes.
Q And the first winter is 2004-'05?
A Uh-huh.
Q And the second winter is 2005-2006.
A Yes.
Q One thing that jumps out; we don't have the February data, but there are way more blue crabs in the winter of 2004-5 than there are in the winter of 2005-6, by her data, right?
A That's correct.
Q Okay. Do you know the mortality numbers for whooping

cranes in the winter of 2004-5 versus the winter of 2005-6?
A No, I don't.
Q Can we put up the exhibit that shows that.
(Pause; Mr. Kahne and Mr. Waites confer off the record)
That's the one. If you'll zoom in on -- is that the one?
Winter mortality. Dr. Slack, if you'll see on the left-hand side, it starts with years and it talks about flock size, and then in the middle there is a column that has the winter periods, right?
A Sure. Uh-huh.
Q And do you see how in the winter of 2004-5 -- and that was the one with more blue crabs according to Dr. Greer -- there were just two deaths --
A Okay. Okay.
Q -- which is a good year for cranes --
A Uh-huh. Uh-huh.
Q -- relatively speaking, right?
A Uh-huh. Uh-huh.
Q And that's a "yes," right?
A Yes.
Q Okay. And, then, for the winter of 2005-6, where there were, according to Dr. Greer, fewer blue crabs, in that year there were six cranes that died, right?
A That's correct.

Q And that's a bad year for the cranes, right?
A Well, that's a -- I don't know what portion of two twenty that is, but if we lose six birds, that's bad. So --
Q When SAGES went to model the energetic requirements of whooping cranes, isn't it true that the two food items that SAGES focused on were blue crab and wolfberries?
A Yes.
Q And we're going to talk about this later on this afternoon, but you're familiar with the International Crane Recovery Plan?
A Yes.
Q And I could put it up if you want, but you know that the International Crane Recovery Plan, as published in 2007, written in 2006, stated very clearly that the International Crane Recovery team believes that wolfberries and blue crabs are of paramount importance to the whooping cranes, right?
A I'm sure they did.
Q They did -- you're sure they did say that, right?
A Yeah. Uh-huh.
Q And, likewise, are you -- let me ask; you may not be -- are you familiar with something called the "Spotlight Species Action Plan" prepared by the U.S. Fish and Wildlife Service?
A Yes.
Q And are you aware that the Spotlight Species Action Plan for the whooping crane, as published in 2009, likewise,

recognizes the paramount importance of blue crab and wolfberries?

A I believe the spotlights plan was written by Tom Stehn. So, I wouldn't expect any other result.

Q The Spotlight Species Action Plan is a fairly important document for the Fish and Wildlife Service, isn't it?

A I guess. I don't think it's mandated by the Endangered Species Act.

Q Well, we had some testimony about its intention of being created so that the Fish and Wildlife Service could focus attention on where it felt high priority and attention --

A Sure. And I --

Q -- needed to be paid, right?

A That's correct.

Q This is something that was prepared at least by the Fish and Wildlife Service with the agency's intention to be careful in what they're putting out to the public, isn't it?

A I don't know. I'm not going to characterize --

Q All right.

A -- Fish and Wildlife Service.

MR. KAHNE: Judge, I'm about to start a new section on where we're going to criticize Dr. Greer's research. And if this is a good time to take a break, I would do that. Otherwise, I'm happy to barrel on through.

THE COURT: I think you need a break.

THE WITNESS: Yes.

THE COURT: Take a break.

(A recess was taken from 4:42 p.m. to 5:05 p.m.; parties present)

THE MARSHAL: All rise.

THE COURT: Thank you. You may be seated.

Ready? Are you feeling all right?

THE WITNESS: I'm feeling good.

THE COURT: Okay.

THE WITNESS: Thank you.

(Pause)

MR. KAHNE: May I proceed?

THE COURT: Yes, please.

CROSS EXAMINATION (CONTINUED)

BY MR. KAHNE:

Q Dr. Slack, do you agree that Dr. Greer's research that is part of the SAGES report and that you have talked about as being the principal evidence on which you have been relying concerning the lack of importance of blue crabs, that that research has some significant flaws?

A Do I agree?

Q Yes. Do you agree with that?

A No.

Q Okay. We're going to start by going through Dr. Greer's video records. And just so you know where I'm going, and after

we do that, if we get to it today, we'll be talking about how the research does not, in fact, assess the abundance of food items except for blue crab and wolfberry, how it focuses on crabs that are too small to eat, by your own testimony, and how she looked at just the three territories that we saw earlier. I just want to let you know where --

A Okay.

Q -- overview where we're going.

I want to start, though, by going back to what Dr. Greer did to look at what whooping cranes eat; and she took a video camera and she filmed them. Isn't that right?

A That's correct.

Q And then Dr. Greer made observations of those films to get her count of food items.

A That's correct.

Q And we had a question earlier this morning from your counsel about the repeatability of Dr. Greer's methodology. And at first you acknowledged that it's pretty hard to see what --

A Some; some tapes.

Q I see. Okay. And that -- you said that in order to repeat her work you would have to have training to look at the foraging behaviors, right?

A Yes.

Q So, if one needs to use that training, doesn't good

research put that as part of the methodology, what kind of behaviors she's looking at to decide what --

THE COURT: Sorry; say that again?

MR. KAHNE: Yes.

What we're going to be showing in a few moments, your Honor, is that when you look at Dr. Greer's videos, you can't see what the cranes are eating. And Dr. Chavez-Ramirez has -- I'll direct your Honor's attention to Plaintiff's Exhibit 386, which has been admitted this morning into evidence.

Do you want to put that up, please? Oh, no. Does that mess you up? Okay. Let me do it this way.

How do I turn this one on?

MR. UNIDENTIFIED: -- the ELMO, please.

(Pause)

MR. KAHNE: This is the chart, your Honor, which reflects Dr. Chavez-Ramirez looked at about 12 hours of video, and each of Dr. Greer's tapes has an identifying number. That's in the left-hand column -- or DVD's --

THE WITNESS: Uh-huh.

MR. KAHNE: -- the video records. And, then, in the next column there are various time periods. And you'll see that Dr. Chavez-Ramirez, with all of his experience, could not identify any food items, except maybe in tape 23, where it was zero to one, and down at the bottom, tape 13, he did see, indeed, one blue crab being eaten. He also characterized the

pictures --

THE COURT: How many hours are there all together?

MR. KAHNE: All -- we submitted 12 hours, and the defendant submitted all of the tapes. I don't know the total number of hours. The defendant's exhibit --

MR. FERNANDES: Fifty-five.

MR. KAHNE: -- we're not going to show you even 12 hours, Judge.

MR. FERNANDES: Your Honor, it's 55 hours.

MR. KAHNE: Fifty-five hours of video that she reviewed.

THE COURT: And that's for her -- that's for everything? Her dissertation is based on 55 hours?

MR. FERNANDES: No, no, no, no. I'm sorry. Fifty-five tapes.

THE COURT: Okay. How many hours?

MR. FERNANDES: I -- do we know?

Do you know, Dr. Slack?

MR. KAHNE: Yeah, you have to answer that.

BY MR. KAHNE:

Q Do you know how many hours Dr. Greer's --

A No.

MR. KAHNE: We don't. Neither side knows. The tapes -- the defendant's tapes are DX -- they put in all of the videos for your Honor's viewing pleasure: DX-313 going all the

way up to DX-328. Dr. Chavez-Ramirez --

THE COURT: Three one three to three two eight?

MR. KAHNE: Correct. That's the defendant's exhibits.

THE COURT: That's 15 exhibits?

MR. KAHNE: I think it would be 16 exhibits.

THE COURT: Sixteen. Sorry.

MR. KAHNE: And the ones that Dr. Chavez-Ramirez reviewed are Plaintiff's Exhibits 237 to 244. And my understanding is that that totals 12 hours.

THE COURT: Two thirty-seven to two forty-four?

MR. KAHNE: Correct.

THE COURT: Okay. How many hours?

MR. KAHNE: Twelve. That was a sampling.

(Mr. Kahne confers with Mr. Mundy)

MR. KAHNE: Okay. Co-counsel has commented that it appears that each of the DVD's is approximately an hour and a half. So, if there were 55 and if my math is right, we're looking at 80 to 90 hours. But I don't know.

We looked at -- this is Dr. Chavez-Ramirez's summary.

THE COURT: So, her -- you said she relied totally on these 80-90 hours of videos?

THE WITNESS: To identify the food items caught by cranes.

THE COURT: Oh.

THE WITNESS: She sampled in the marsh the availability of crabs and wolfberries.

THE COURT: I understand. Thank you.

THE WITNESS: There's two different things going on.

THE COURT: I thought -- I thought I heard you to say that she relied on the videos for the -- to determine the food.

THE WITNESS: Diet.

MR. KAHNE: To determine what the cranes ate.

THE COURT: What the cranes ate.

MR. KAHNE: That is what I said; I hope.

THE COURT: I mean, I thought that's what he said.

THE WITNESS: Yes.

MR. KAHNE: I hope we both said that.

THE COURT: Okay.

MR. KAHNE: I think we all agree to that.

THE COURT: Have you watched all of these tapes?

THE WITNESS: I have not watched all of them. I've watched well over --

THE COURT: How many do you figure?

THE WITNESS: Well over half.

THE COURT: Did you find some unclear also, and fuzzy?

THE WITNESS: Yes, I did. But, your Honor --

THE COURT: Out of your 40 hours or so, 40-45 hours, how many did you think were unclear?

THE WITNESS: Are you asking me that question?

THE COURT: Yes, sir.

THE WITNESS: Oh.

THE COURT: What percentage?

THE WITNESS: Are you going to show these?

MR. KAHNE: We're going to show a sampling, yes, as many as you would like to see --

THE WITNESS: Oh. Okay.

MR. KAHNE: -- but we were going to put up two.

THE WITNESS: I found that after I observed them for a couple hours, three or four hours, I got better. And I didn't have this -- the kind of training that she went through to identify feeding behaviors, which was intense. And the more I watched, the more I could shake my head and say, "Now, if I rerun -- reran that and reran that and reran that, I could figure that out."

THE COURT: Okay. You've watched 40-45 hours of tapes.

THE WITNESS: Uh-huh.

THE COURT: And what percentage of those were not -- were too fuzzy to determine?

THE WITNESS: Oh, I can't tell you. I would say -- too fuzzy -- some of the close-up pictures were really difficult. I would say 10 to 20 percent. But she didn't -- you know, when she would only use what she could see, even

though the whole tape, there might be a part of the tape up there, 0 through 24 are timed to a DVD that say -- there might be part of that really bad but part of it seeable. As long as she had four to five minutes of good time, then she used that block and then went on.

THE COURT: Well, over an entire winter feeding? Is that a proper representation?

THE WITNESS: Well, I think it's pretty good.

THE COURT: You do?

THE WITNESS: Uh-huh.

THE COURT: Okay.

MR. KAHNE: Judge, the other thing that I'd like --

THE COURT: Better than Dr. Chavez-Ramirez that watched every single day, all day long, for two full winters?

THE WITNESS: Uh --

THE COURT: This is a couple of weeks?

THE WITNESS: I would say -- I would say the intensity of her observations was the equivalent --

THE COURT: What do you mean "intensity"?

THE WITNESS: Well, I don't think Dr. Chavez-Ramirez --

THE COURT: She really, really looked over two weeks?

THE WITNESS: I don't think Dr. Chavez-Ramirez looked at, you know, 10 hours a day every day for two winters. He was doing more than --

THE COURT: You said he was there every day for two winters.

MR. KAHNE: I believe he said six days a week, but I may have misremembered that.

THE COURT: Six days a week for two full winter periods.

MR. KAHNE: That's right; 300 days, thereabouts.

THE COURT: Okay. Go ahead.

MR. KAHNE: All right. Now, your Honor, I just want to call your attention to the second part of -- excuse me. This is also Plaintiff's 386. And what you're going to see in Dr. Greer's data is she talks about what food items she claimed to be able to see the cranes eat.

And in the -- this is the second page of that exhibit -- you will see that, for example, if you look at tape 49, in the first segment of the tape she didn't see any food items either. Dr. Chavez-Ramirez didn't see any, and she didn't either. But in the last three segments of the tape -- and the tape has separate I.D. numbers on it -- she saw what looked to be about 900 food items. He didn't see any.

Dr. Chavez-Ramirez, we believe we've held out to the Court, is a highly experienced observer of cranes. If you look at tape 50, she claims to see 707 items, and he didn't see any. If you look at -- and the two numbers that I'm comparing, okay, 707 at line 50, tape 167, you can see on the first page of

the -- well, tape 50 is up at the top -- and --

THE COURT: Are you going to show me some of this?

MR. KAHNE: I am. I am. But first I need to lay a little bit of a foundation with this witness.

THE COURT: I've got it.

MR. KAHNE: Okay.

BY MR. KAHNE:

Q You've talked about Dr. Greer having done this intense training --

A Uh-huh.

Q -- to be able to interpret what she is looking at, and --

A That's correct.

Q -- and I am asking you: Is there anything about her training that is reported in her research, in her dissertation? Does it say how she trained?

A No, but she made observations of cranes in the field when she was doing other things. She made observations of food items in the field, and those food items that she looked at, she got so she was familiar with where they were appearing in the habitat, in what habitat, and then she watched the birds forage in those habitats for those kinds of food items, and she is able to connect location with feeding behavior with feeding response and then put that together. And that was the training she went through.

Q You didn't train her. Is that correct?

A No.
Q Dr. Chavez-Ramirez didn't train her, right?
A And I didn't train Dr. Chavez-Ramirez either.
Q That's fine. But he didn't train her, did he?
A No.
Q And Tom Stehn didn't train her to do this, look at the videos, and --
A No.
Q Okay. And do you know who, if anything, other than herself, trained her to look at these videos and see the food items?
A I can tell you that she put the time in to do the work. I mean, it was --
Q I'm not disputing --
A -- a hundred --
Q -- that she was there a long time.

MR. FERNANDES: Your Honor --

MR. KAHNE: Did she train herself?

MR. FERNANDES: Your Honor --

THE COURT: Hold.

MR. KAHNE: Excuse me.

MR. FERNANDES: -- if he could be permitted to complete his answers before he gets cut off.

THE COURT: Fine.

Okay. This is really simple. Do you have any idea,

from firsthand knowledge -- firsthand knowledge -- how she trained to determine from the videos what the cranes were eating?

THE WITNESS: Her training was her experience in the field.

THE COURT: Did you watch her train?

THE WITNESS: Pardon?

THE COURT: Did you see her train for this?

THE WITNESS: I saw her run one tape one time. Right.

THE COURT: Okay. I'm not talking about the tapes; because you said, you testified earlier, that she determined what the cranes ate from the videos.

THE WITNESS: That's correct.

THE COURT: Okay. How did she train to do that interpretation? Do you know from your firsthand knowledge?

THE WITNESS: Her training was done in the field --

THE COURT: With you?

THE WITNESS: -- watching the birds. No. No.

THE COURT: With Mr. Stehn?

THE WITNESS: No.

THE COURT: With any -- with Mr. Chavez-Ramirez?

THE WITNESS: She -- she had worked at the --

THE COURT: With Mr. Chavez-Ramirez?

THE WITNESS: -- International Crane Foundation.

THE COURT: When did she do that?

THE WITNESS: Before she came to Texas A&M in early 2000.

THE COURT: So, did she work with whooping cranes at the International Crane Foundation?

THE WITNESS: I don't know. She worked on cranes.

THE COURT: So, we don't know how she trained, is the bottom line?

MR. KAHNE: That's what I'm trying to get to, your Honor.

THE COURT: So, all we know is that she took a bunch of videos and said that she could tell what they were eating.

MR. KAHNE: So far, that's all we know.

THE COURT: That's what we know right now.

MR. KAHNE: Uh-huh.

THE COURT: Okay. I suppose you're going to tell me all sorts of new things.

BY MR. KAHNE:

Q I'm going to ask the witness if she reported in her dissertation anywhere -- the dissertation that you supervised -- did she report anywhere how she trained?

A She did not say, "This is my training." Neither did Chavez-Ramirez. Neither did Hunt. None of my graduate students report that in their dissertation.

Q All right. Now, in her dissertation, did she describe any

of the behaviors that she used to interpret the videos?
A In the dissertation? I don't think it was in great detail if she did.
THE COURT: Well, we're talking methodology, right?
THE WITNESS: Uh-huh.
MR. KAHNE: I am talking methodology, yes.
BY MR. KAHNE:
Q So, your answer is, no, the dissertation -- if someone wanted to repeat her work, using her videos, am I correct there is nothing in the dissertation that says, "Here is how you interpret this behavior"?
A She said she interpreted the food items based on behavior and habitat type and kinds of food available in the marsh.
Q Dr. Slack, I --
THE COURT: I'm not getting this.
THE WITNESS: Pardon?
THE COURT: I'm not getting this. I need some more help with this.
THE WITNESS: Well, that's what she said in the dissertation.
THE COURT: I know that's what she said, but how did she know to do that? If the dissertation didn't explain how she learned these feeding matters, these feeding processes, how could they be duplicated?
THE WITNESS: It can be duplicated the same way with

the same kind of effort that Felipe Chavez-Ramirez made on his dissertation research.

THE COURT: Well, we're not talking about him. We're talking about Dr. Greer.

THE WITNESS: Well, I heard her in the laboratory; I heard her talk about her evaluation and tapes; I heard her talk about what she -- how she was doing it.

THE COURT: Okay. But --

THE WITNESS: And she had talked about it, but I -- and, so, I guess I tacitly approved it.

THE COURT: I understand that. I understand. I suppose any of us could stand up and say, "Okay, this video means that the whooping crane's eating a snail."

THE WITNESS: Uh-huh.

THE COURT: But I would have to have -- I would expect someone to ask me, "How do you know that that whooping crane's eating a snail?" "Because I have observed this whooping crane eat a snail in that area every day for 35 days."

THE WITNESS: Right.

THE COURT: "And I trained with this person who explained to me how to do this." Now, we don't have any of that here for Dr. Greer, is what the defendant is -- is what the plaintiff is saying. See what I mean?

THE WITNESS: Yes, I do. And I can tell you that doctoral students are -- you know, they're pretty mature and

capable of figuring out what has to be done, and she did that.

THE COURT: I understand that, but part of -- I understand this, because my daughter is getting her doctorate right now.

THE WITNESS: Uh-huh. Uh-huh.

THE COURT: She has a committee, and she goes to them, and talks about the methodology and how to get the -- and how to get their expertise on how to gather the information so that it's repeatable --

THE WITNESS: Uh-huh.

THE COURT: -- so that her methodology and her findings can be interpreted at the end of the day --

THE WITNESS: Right.

THE COURT: -- by other peers. And that's what I'm trying to figure out here.

Now, I can understand, because in an academic -- if you tell me that, I'll understand it. In an academic situation, you just rely on people to tell you the truth. Right?

THE WITNESS: That's correct.

THE COURT: And it's like being a physician. Everybody -- you know, physicians and doctors don't get along -- physicians and lawyers don't get along, because doctors take people --

MR. KAHNE: I married one, Judge. I have to --

THE COURT: I married one, too. And doctors take people on their word. That's part of their craft. If they come in and say, "I'm hurting here," they believe them, and lawyers never figure that out. You know? Lawyers look at things differently.

So, in the doctoral student, when they tell you that this is the -- that they have field-tested this, you're going to believe them; but you don't know it to be the fact.

THE WITNESS: That's true, but I don't know that they are not telling me the facts.

THE COURT: I realize that.

THE WITNESS: Right.

THE COURT: But I guess that's the problem about repeatability.

MR. KAHNE: Yes. The point is, I think, the way your Honor has said it, when you look at the dissertation, if you're not there and if she's not there, you have no idea what technique she used when she looks at the video to make any inference at all. You don't know. Nobody knows.

THE WITNESS: You have not made that same argument with all of my other students.

THE COURT: Oh, that's -- don't get upset. We're just here talking.

MR. KAHNE: I'm going on, if I may.

THE COURT: It's a skill. It's like doctors and

lawyers. It's a -- we come from a different way of looking at things. Right?

(Pause; no audible response)

BY MR. KAHNE:

Q Now, at the deposition with Mr. Blackburn, you testified that before your deposition you had, indeed, looked at some of Dr. Greer's video. Is that correct?

A That's correct.

Q And you also testified that before your deposition, which took place in October -- I think it was October 25th. Is that right? We've got the deposition. It looks like October 25th.

Do you see that on the cover page?

A Yes. I see it. I see that.

Q So, it's -- and where are we now? We're in December. So, about six weeks ago.

As of that time, you had not studied Dr. Greer's video, right?

A I had not studied them. That's correct.

Q Okay. And you know that Dr. Greer claimed to be able to identify cranes eating insects.

A That's correct.

Q You did not, in fact, verify any of her identification of insects being eaten by whooping cranes.

A No, but that's a reasonably easy case to make.

Q I don't understand, but let me first make sure I'm right.

You did not, in fact, verify any of her identification of insects being eaten by whooping cranes. Am I correct?

A Insects, snails, crabs, et cetera. Right.

THE COURT: I --

MR. KAHNE: So --

THE COURT: I understand what you're saying. This is getting to be painful. It's, again, the old doctor-lawyer thing. The patient comes to the doctor, says, "My left arm is hurting."

THE WITNESS: Uh-huh.

THE COURT: And the doctor proceeds on with that. You're going to --

THE WITNESS: Sure.

THE COURT: -- x-ray, and you can look at it, but the lawyer says, "Well, how many people have you told before today that your left arm was hurting?" And it goes on and on and on. It's just a different way of looking at things.

So, let's kind of move on with this. There is no way he's going to tell me he could see all of the insects being eaten.

MR. KAHNE: Very good. He couldn't --

THE COURT: Right?

MR. KAHNE: Am I right you didn't --

THE WITNESS: That's correct.

MR. KAHNE: -- attempt to verify any --

THE WITNESS: You're right, your Honor.

MR. KAHNE: -- of the food items before the deposition?

THE WITNESS: Before the deposition, no.

MR. KAHNE: I'm correct, right?

THE WITNESS: Yes, you are.

BY MR. KAHNE:

Q All right. And, likewise, before the deposition, you didn't even attempt to replicate Dr. Greer's count of food items, right?

A That's correct.

Q All right. So, now we're going to do this video, and I think that what I'd like to do --

THE COURT: Ms. Gano?

MR. KAHNE: I'm sorry?

THE COURT: I need to switch over to the computer.

MR. KAHNE: Yes. This I'm going to return to you. And, then, the one that I'd like to show first -- we picked two samples. We're happy to show more.

THE COURT: Thank you.

MR. KAHNE: And I have, of course, misplaced the thing on which you identified the segments that we're about to see. Ah, there it is. First one, this one?

We're going to look at Plaintiff's Exhibit 240 that

corresponds to Tape 23, and this is from the winter of 2004-2005.

And if you, with your practice, can identify that the cranes are eating any food, please let me know.

(Began playing Plaintiff's Exhibit Number 240 video at 5:28 p.m.)

THE COURT: Can you?

THE WITNESS: Like I said, your Honor, it's inappropriate to expect me, without the kind of effort that she put into this --

THE COURT: I agree with you.

THE WITNESS: -- and my background, to identify this.

THE COURT: I agree with you. Just say, "I don't know," or, "I can't answer that." That's fine.

THE WITNESS: I can't answer that.

THE COURT: Is it okay, Mr. Fernandes, if I help him out here?

MR. UNIDENTIFIED: That's fine.

THE COURT: Or not?

(Stopped playing Exhibit Number 240 video at 5:28 p.m.)

BY MR. KAHNE:

Q Let's -- I think we can go to 242.

MR. UNIDENTIFIED: Let's go to the next one.

MR. KAHNE: Next video. This is a video taken from Plaintiff's Exhibit 242. It's Tape Number 49. It's 2005-2006;

that winter.

(Began playing Plaintiff's Exhibit Number 242 video at 5:29 p.m.)

And, again, my question is: If you can see the cranes eating any food at all that you can identify, let me know.

(Pause)

Do you want to fast forward it just to some other segment?

THE COURT: I don't see any eating going on there, do you?

THE WITNESS: No. Preening.

BY MR. KAHNE:

Q Let me ask you this question.

You have now looked at, you said, I think, quite a number of hours of tape.

A Yes, I have.

Q Do you claim that you can identify any significant -- there is another segment. Can you tell what food they're eating?

A No.

Q Could anyone tell what food they're eating from this segment? The cranes are completely obscured by the grass, aren't they?

THE COURT: Okay, but what he's telling me is that if

you studied the behavior you would know that that meant "X." None of us here has studied the behavior.

MR. KAHNE: Well, you've studied crane --

THE COURT: Is that right? Sir, you can't -- you can't tell.

THE WITNESS: I have not -- I have not studied the way she did --

MR. KAHNE: So --

THE WITNESS: -- to do it.

MR. KAHNE: Let me ask you this question.

THE WITNESS: Yes.

BY MR. KAHNE:

Q If we picked any random segment of any of the videos that have been seen, do you now claim that you could identify any sizable -- that you, as the foremost publisher of at least the largest number of articles published on cranes; that was the testimony from this morning -- could any crane researcher identify the foods, not knowing what she did, but just looking at the videos?

A Well, that's your problem. It's not just the videos. It's the habitat. She was out there foraging -- she was out there observing cranes; she was filming; she knows what habitat those cranes were in. She knows the kind of food they appeared to be eating. So, she has information in context that I don't have. I don't know what territory this is.

THE COURT: I agree with you. I don't know that this is going to get us anywhere.

MR. KAHNE: All right.

THE COURT: You know, he's attacking her research, and I can certainly see why. I don't think he's going to be able to rehabilitate her research.

MR. KAHNE: All right.

THE COURT: Unless it's by redirect; and then I'll give you another chance.

Is she going to be testifying?

MR. KAHNE: Not on the witness list.

THE COURT: Okay.

And, again, you know, it's sort of a matter of trust.

MR. KAHNE: Well --

THE COURT: And we don't have to trust it, because we're lawyers. We don't work that way.

MR. KAHNE: I don't trust it, your Honor.

THE COURT: We don't have to. But he should. That's his job. It's not to go around checking up on all of his graduate students.

MR. KAHNE: One doesn't want to argue with the Court; so, one won't.

THE COURT: Well, I don't think that that would be his job, to go up and -- to go out and do that.

//

BY MR. KAHNE:

Q Wouldn't it be true that, as a faculty supervisor of a thesis, it would be your responsibility to train your students sufficiently and to oversee them sufficiently so that the research that they produced is something that could be reproduced by others?

A Sir, I will tell you, of all of my graduate students, this student spent the most time on methodology and on techniques of any student I have had. And, so, I mean, when I see a student put that kind of effort into it and work that hard, her sampling of crabs in the marsh is unbelievable.

Q Well --

A And it's an amazing bit of work that no one -- National Marine Fisheries doesn't do it; Corps of Engineers doesn't work in the marsh like she does -- she did; so, I have to, as the judge said, trust her.

Q Isn't it true that she had some difficulty completing her thesis?

A Well, what kind of difficulty are you talking about?

Q I am only asking for a general characterization without going into a lot of details about someone else's work.

Isn't it true that she had some difficulty, that it was not -- the first presentation was not fully accepted, and had to go back and do more stuff?

A No.

Q All right.
A No.
Q I'll leave it be.
THE COURT: Actually, that wouldn't be unusual, though, would it?
THE WITNESS: No; but I thought there was more in the question that he was --
THE COURT: We're just moving on.
THE WITNESS: Okay.
MR. KAHNE: We're moving on.
BY MR. KAHNE:
Q Her thesis hasn't been published, right?
A No, it has not. She's working at a small state school in Massachusetts and worked at a private school in Chicago, and she is, you know, keeping her nose above water and treading water while she's teaching, and it's very, very difficult. But she's got very publishable information.
THE COURT: She's what? I'm sorry?
THE WITNESS: She has very publishable information.
THE COURT: Thank you.
BY MR. KAHNE:
Q You would agree that her unpublished --
THE COURT: Doesn't the -- don't they go in some central repository or something?
THE WITNESS: Yes; I think the University of Michigan

used to get the dissertations when everything was hard copy.

THE COURT: Okay.

THE WITNESS: Now that everything's computer --

THE COURT: All right.

THE WITNESS: -- I don't know where it goes.

THE COURT: That doesn't happen. Okay.

THE WITNESS: Yeah.

THE COURT: Somewhere.

THE WITNESS: Somewhere. But you're right.

THE COURT: So, I'm mistaken. I'm back in the old days when somebody had a copy.

THE WITNESS: That's right.

BY MR. KAHNE:

Q So, her thesis is not a peer-reviewed document, right?

A No.

Q I'm correct, right?

A It's not a peer-reviewed document in the sense that we in academia call something "peer-reviewed."

Q All right. Now --

THE COURT: Have you co-authored any articles with her?

THE WITNESS: I've co-authored presentations in national and state --

THE COURT: Any articles?

THE WITNESS: No. Not yet.

THE COURT: Okay.

THE WITNESS: There will be.

THE COURT: But at this time you have not asked her to co-author any work with you?

THE WITNESS: No.

THE COURT: And you have with Mr. Stehn and Dr. Chavez-Ramirez? Is that right?

THE WITNESS: Most of the time my students put me on their publications and I let them get the publications first. And then --

THE COURT: I thought you had asked some of these people to publish with you.

MR. KAHNE: I thought he said so.

THE WITNESS: I don't think so. I don't --

THE COURT: But you had asked Dr. Chavez-Ramirez to appear on --

THE WITNESS: We have --

THE COURT: -- committees with you, at least.

THE WITNESS: We have -- oh, we have done that. Yes.

THE COURT: Okay.

THE WITNESS: I'm sorry.

THE COURT: Has this -- Dr. Greer appeared on any -- have you asked her to be on any dissertation committees?

THE WITNESS: No. She just got her Ph.D. and moved away.

THE COURT: Okay. I understand.

BY MR. KAHNE:

Q Dr. Slack, in addition to relying on -- in addition to approving Dr. Greer's thesis, for which you trusted her --

A Uh-huh.

Q -- isn't it true that you relied on Dr. Greer's conclusions in preparing the white paper that we discussed earlier, SAGES, and the expert report that you submitted to this Court, all three of those put together, each -- each time you relied on Dr. Greer's conclusions, right?

A Well, what do you do with data but use it? And certainly if you're preparing testimony or preparing the SAGES report, which she was a part of the SAGES team, we would use the data in that analysis.

Q And it's true that before you relied on Dr. Greer's data for your white paper, SAGES report, expert report, and your -- and all the way up until the deposition six weeks ago, you never studied the underlying data?

A That's not true. The data -- I mean, her dissertation was more than those observations of taped --

MR. KAHNE: Excuse me. I withdraw that question.

THE WITNESS: Her dissertation was about --

THE COURT: No --

THE WITNESS: -- the availability of food in the marsh, which she sampled. And I definitely saw that data long

term in advance, because there were papers given on it, and she -- I mean, she was a part of our team. So, we worked with her.

BY MR. KAHNE:

Q I guess what I'm getting at is this. I have heard that --

THE COURT: I've got where you're getting at. Move on.

MR. KAHNE: I am moving on.

BY MR. KAHNE:

Q You testified this morning -- let me just make sure that's where I'm going. That's not where I'm going yet.

You testified this morning that Dr. Greer looked at the abundance of food items available to blue crabs, right -- available to whooping cranes, right?

A She looked at material that she captured in her throw traps and in the boom traps. Yes.

Q Okay. But isn't it true that the only food items that she quantified for abundance -- this is a different part of the study, Judge. This is not about what do they eat; this is what's there.

A Uh-huh.

Q What she looked at for abundance was blue crab and wolfberries, and that's it.

A That's correct.

Q So, one -- nobody could tell from her thesis what is the

abundance or availability of insects, clams, snails, or any other food items.

A That is correct.

Q All right. Now, I believe that under -- you've testified that the cranes do this cost-benefit analysis: What's there; what's easy to get to. Abundance matters, right?

A It does.

Q Okay. One other work -- I believe it was by your student, Nelson. I think that you testified Nelson was the one who didn't go into the field, is that right, in 1995? In any event, the Nelson study didn't look at abundance either, did it?

A No.

Q I'm correct, right?

A Yes.

Q Okay. I apologize for asking the double negative questions there.

Now, Dr. Chavez, in 1996, he found low abundances of stout razor clams and snails, right? That's in Plaintiff's Exhibit 13.

A I believe that's the case.

Q All right. And isn't it also true that Dr. Chavez-Ramirez found acorns and dwarf clams available only during a very short period of time during the winter?

A I would have to look at the extent of Dr. Chavez-Ramirez's

availability studies.

MR. KAHNE: Okay.

Would you put up that exhibit, please? Thirteen. Plaintiff's 13.

THE WITNESS: Uh-huh.

BY MR. KAHNE:

Q And the chart that would show abundances of --

(Pause; Mr. Kahne and Mr. Waites confer off the record)

MR. KAHNE: That's the exhibit, the hard copy.

THE COURT: Okay. Thank you.

MR. KAHNE: But do we not have that on the --

MR. UNIDENTIFIED: I do.

MR. KAHNE: Oh, good.

(Pause)

BY MR. KAHNE:

Q All right. There is another paper by Sherry and Chavez-Ramirez from 1998; Plaintiff's Exhibit 16? Do you have any reason to disagree -- let me ask you this.

Do you have any reason to disagree with the conclusions of Chavez, that he found low abundance of stout razor clams and snails and that he found acorns and dwarf clams were available only for short periods during winter?

A When you look real quickly at his methodology and his dissertation, which I just did, the methodology for clams and others was very minimal compared to looking at blue crabs and

wolfberries.
Q He didn't find very many right?
A Wolfberries and blue crabs?
Q No; clams and snails.
A No, he didn't.
Q All right. And Sherry and Chavez-Ramirez, they published in 1998. It's in the record at Plaintiff's 16.

"Low abundance and availability of clams and snails except regarding dwarf clams for short periods of time."

A Where are you reading that?
Q I'm reading from my summary. We can put that up, as well, if you want. We've probably got a copy of it.

(Pause; voices and whispers off the record)

MR. UNIDENTIFIED: Here is a copy --

THE WITNESS: Thank you.

Okay. I have it.

BY MR. KAHNE:

Q Okay. And, so, that's Plaintiff's 16.

Now, your own article, Slack from 1989, which is Plaintiff's 206; you didn't find any more than trace amounts of acorns, right?
A Are you asking me that about this paper?
Q In Hunt and Slack, 1989, your paper.
A Oh. So, we're not talking about the Sherry?

Q No, I -- the papers will reflect what they say. Sherry and Chavez-Ramirez found low abundance and availability for all clams, and I take it you don't know what they did or didn't find at this point.
A That doesn't surprise me. Clams are notoriously difficult to sample.
Q And if they aren't there, the cranes can't eat them, right?
A That's true.
Q Okay. An essential part of your theory that if crabs aren't there, you say the cranes will eat something else, right?
A Yes.
Q And if the clams aren't there, they aren't going to eat clams, right?
A That's correct.
Q And isn't the reason -- isn't part of the reason why for so many years scientists have considered blue crabs and wolfberries to be so important is that, in fact, at least during the first part of the winter, wolfberries are abundant, at least in most years, and blue crabs have been abundant in many years? Isn't that true?
A For December, early January, correct.
Q Okay. And that abundance is part of why all scientists to look at this question, including yourself, have found blue

crabs and wolfberries to be of great importance to the normal crane diet.

A They are important. But just because Dr. Chavez-Ramirez cannot find clams in sampling at one site for one time doesn't mean the clams don't exist. Cranes are better foragers, and they can figure things out, than we can.

Q Is that how you're characterizing Dr. Chavez's research in his paper and the dissertation you supervised and in the paper that he published in 1998 which Sherry --

A No, you were characterizing the import of his results. I was only characterizing a brief re-review of his methodology.

Q Have you studied or reviewed the literature of abundance of food items for cranes at the refuge?

A My students have studied that, yes.

Q Do you know any of those results of abundance for food items for cranes at the refuge?

A There have been very little done on clams, insects, and snails.

Q But the ones that have existed are Dr. Chavez-Ramirez, Sherry and Chavez-Ramirez, Hunt and Slack, Westwood and Chavez-Ramirez; and in each of those cases, what they found, by whatever methodologies they used, was consistent that typically the foods, other than wolfberries and crabs, were either low abundance or only episodically in high abundance. Isn't that right?

A Hunt never looked at food abundance of snails and clams and insects. He never did.
Q That's right. And --
A And I don't believe that Chavez-Ramirez did either. He looked at abundance of crabs in crab pots and open water pools, but I don't believe that you can characterize his intense -- his intensity of availability equivalent to that of Dr. Greer's.
Q But Dr. Greer didn't look at abundance.
THE COURT: Does -- she looked at three spots for two weeks for the videos?
THE WITNESS: Well --
THE COURT: Is that right?
THE WITNESS: -- you are correct. You are correct. Yes.
THE COURT: I usually am.
(Laughter)
THE COURT: Thank you.
THE WITNESS: I'm sorry for pointing at you. I --
THE COURT: I'm kidding. That's fine.
MR. KAHNE: Am I moving on?
MR. UNIDENTIFIED: You're moving on.
MR. KAHNE: I'm moving on. I have one --
THE COURT: He was talking about me being correct.
MR. KAHNE: I have -- I hope --

THE COURT: Not you.

(Laughter)

BY MR. KAHNE:

Q I am moving on to talk about Dr. Greer's trapping of blue crabs.

A Okay.

Q In your deposition, isn't it true that you testified that, basically, cranes don't eat blue crabs that are smaller than 30 millimeters across?

A That is not the size class that cranes would prefer to eat, I'm sure.

THE COURT: How do you know that?

THE WITNESS: Because they eat bigger ones. You can see them. They're a little bit bigger.

THE COURT: How do you know that?

THE WITNESS: That's based on Chavez-Ramirez, and it's based on --

THE COURT: How big is 30 -- whatever?

THE WITNESS: That's -- one inch is 25.4 millimeters.

THE COURT: Thank you.

MR. KAHNE: So --

THE COURT: So, inch and a quarter or so?

THE WITNESS: Uh-huh.

MR. KAHNE: That's right.

//

BY MR. KAHNE:

Q So, what you testified at your deposition was that, basically, cranes don't eat crabs that are less than 30 millimeters, right?

A I guess I said that. I presume I said that.

Q All right. Now --

A But -- it's a very important "but" -- Dr. Greer sampled all size classes available in the marsh.

Q And that's what I want to talk with you about.

Do you know how many total crabs Dr. Greer sampled?

A How many total crabs?

Q That's right.

A No, I do not.

Q Do you know -- if I tell you 1,505 total crabs --

(Pause; voices and whispers off the record)

THE COURT: One thousand what?

MR. KAHNE: One thousand five hundred and five. This is coming from her data sheets. As part of the backup material that we received, there are extensive Excel -- is it an Excel spreadsheet?

MR. UNIDENTIFIED: Yes.

MR. KAHNE: Yes? It's an extensive Excel spreadsheet. Unfortunately, we have not yet been able to condense it down to something that I can put under this thing; but there were 1,505 crabs.

Does that sound about right?

THE WITNESS: I think you're mixed up on her recent -- her availability study of blue crabs occurred through trapping. There were literally thousands of crabs that she trapped and brought back to College Station and filled my laboratory with little bottles all over the place.

THE COURT: In the middle of the feeding season for the blue crabs?

THE WITNESS: Well, when she would throw the big --

THE COURT: She took them out?

THE WITNESS: She would throw the big -- the big --

THE COURT: Now we know. Now we know the crisis.

(Laughter)

THE WITNESS: And, so, what you were referring to, I think, is the number of crabs she identified as being eaten by whooping cranes.

MR. KAHNE: I don't think so.

THE WITNESS: Okay.

THE COURT: She really brought thousands of crabs back to A&M?

THE WITNESS: She brought thousands of jars back and they had crabs and fish and anything that would move --

THE COURT: Okay.

THE WITNESS: -- back with her. So, I don't -- I assume there were crabs in all of these things. I mean, they

were everywhere.

MR. KAHNE: Okay.

THE WITNESS: Filled every shelf and every table.

THE COURT: And did they all die?

THE WITNESS: Well, they were dead.

THE COURT: Oh, they were already dead.

THE WITNESS: Oh, yeah. Yeah, yeah. And, then -- you know, they're little guys, like, not --

MR. KAHNE: So, from two forty-five?

THE COURT: They didn't travel well?

(Laughter)

THE WITNESS: We had to -- well, I won't say. We followed the appropriate techniques.

MR. KAHNE: Do you --

THE COURT: What does that mean?

THE WITNESS: We killed them --

THE COURT: I don't want to know.

THE WITNESS: -- humanely.

THE COURT: You killed them. Right. Okay. That's all right.

THE WITNESS: Humanely.

THE COURT: I don't want to know.

BY MR. KAHNE:

Q All right. We have the Excel spreadsheets from Plaintiff's Exhibit 245 already admitted.

THE COURT: Go back to the ELMO, then.

MR. KAHNE: Well, they don't all fit under the ELMO, so, first I want to see if the witness has ever seen them.

(Pause)

THE WITNESS: This is part of her observational studies of the tapes. It is not a part of her availability of blue crabs.

(Pause)

BY MR. KAHNE:

Q Dr. Slack, I'm going to read a header to you and then ask if you still stand by what you just testified.

A Okay.

Q I confess, as you can see, that there is a limit on my knowledge as well, so --

A Okay.

Q I'm trying to do my best here.

It says:

"Juvenile and adult blue crab density and environmental data collected via enclosure trapping at Aransas."

A Okay.

Q Is that what you understand to mean they were eaten, or they were trapped?

MR. FERNANDES: Could he show the witness the document?

MR. KAHNE: I'm sorry? I'll show him anything you want. I don't mean to --

MR. FERNANDES: If you can show him the document.

MR. KAHNE: I will. That's the one I just brought up to him. It's the same two pages.

(Pause)

THE WITNESS: Okay. I concede.

MR. KAHNE: I'm sorry?

THE WITNESS: I concede.

MR. KAHNE: Okay. Did you say you "can see"?

THE WITNESS: The reason I -- The reason I said that is that there was a series of spreadsheets that looked just like this that -- but I would venture to say 1,500 crabs is more crabs than Felipe Chavez-Ramirez captured in his studies.

BY MR. KAHNE:

Q Okay. But do you now agree, having looked at that header --

A Uh-huh.

Q -- that these two pages --

A Uh-huh.

Q -- represent the -- the --

A Uh-huh.

Q -- what Dr. -- it says also -- I'll just show this again, at the top.

Do you see where it says October, 2004, to March,

2006? That's on the top under columns J and K.
A Uh-huh. Uh-huh.
Q I, J, K?
A Uh-huh. Uh-huh.
THE COURT: You have to answer with words. I'm sorry, sir.
THE WITNESS: Yes.
BY MR. KAHNE:
Q Okay. So, these two pages reflect the total crabs that she trapped, right?
A Well, I --
Q That Dr. Greer trapped.
A -- I can't -- I can't answer that.
THE COURT: Could you back up just --
THE WITNESS: I don't know what all of her data sheets --
THE COURT: Could you just back a little bit from the microphone, please?
THE WITNESS: Okay.
THE COURT: Thank you.
Is that all right, Ms. Gano?
COURT RECORDER: Yes, your Honor.
THE WITNESS: And how many crabs were there, did you say?
//

BY MR. KAHNE:

Q Do you know? As we sit here today, do you know how many crabs she trapped?

A No, I do not.

Q Do you know that out of the 1,505 total crabs that she trapped, the vast majority -- approximately, I'm going to say, 1,311 -- one three one one -- I say "approximately" because I didn't count them.

A Okay.

Q But I have been told that, by the Excel spreadsheet, 1,300 out of the 1,500 crabs were less than 20 millimeters in size.

A Okay.

Q Are you aware of that?

A Yes.

Q Okay. And are you aware that another 101 -- that's the count I've been given -- another 101 crabs were between 20 and 30 millimeters in size?

A Okay.

Q Does that sound about right, based on what you know of her research?

A Yes.

Q All right. And what that leaves is a total of 93 crabs --

A Okay.

Q -- that were greater than 30 millimeters in size.

Is that consistent with your understanding of

Dr. Greer's research?
A It doesn't surprise me.
Q Doesn't surprise you. Okay.
Is it consistent -- that's -- roughly speaking, what you understand is that out of 1,500 crabs that she caught, more than 1,400 of those crabs were too small for the cranes to eat.
A Yes.
Q In fact, isn't it true that --
THE COURT: Wait, wait, wait. Don't talk till you get to the microphone.
BY MR. KAHNE:
Q In fact, isn't it true that Dr. Greer's methodology systematically caused her not to collect the blue crabs?
(Pause; voices and whispers off the record)
A I would say that it was more likely a bias in the marsh than in a boom drop trapping.
Q All right. Also, on page 96 and 97 of her thesis, Dr. Greer admits that her crab size is tiny. That's my characterization. But it's in the thesis there.
But can you get me --
THE COURT: Do I have the thesis in evidence?
MR. KAHNE: No.
BY MR. KAHNE:
Q The --
Can you get me the picture?

THE COURT: I guess, her dissertation, I mean.

MR. KAHNE: Is there a difference?

THE COURT: Yes. Thesis for master's; dissertation for Ph.D.

MR. KAHNE: Oh. Okay.

THE COURT: Right?

THE WITNESS: Right.

MR. KAHNE: Thank you.

No wonder my family hates me.

(Laughter)

Oh, it is an exhibit? What I want is the picture of her throwing the crabs. It's Defendants' Exhibit 414.

(Pause)

MR. WAITES: Can I have the overhead, please, or the computer?

BY MR. KAHNE:

Q All right. You see in the second row of photographs there is a picture of Dr. Greer, and she's throwing this huge pot out into the air, right?

A That's correct.

Q And --

THE COURT: Is that a bay or an estuary? Do we know?

THE WITNESS: It's in the marsh.

THE COURT: It's in the what?

THE WITNESS: In the marsh.

THE COURT: Marsh? Okay.

BY MR. KAHNE:

Q Isn't it true that anyone with experience -- well, let me ask you this.

How much do you -- do you know anything about trapping crabs?

A I sat in on strategy sessions with Tom Minello, who is probably the expert on blue crabs in Texas, and on her advisory committee, on her graduate committee, with Danielle Greer, and we went over this trapping technique. No question about it.

Q Isn't it true that anyone with experience with crabs knows that the bigger crabs flee far too quickly to be caught this way?

A I would say you're correct, but walking a transect through shallow water in the upper part of the territory certainly scares crabs as much as throwing a trap out in front of you.

Q Well, let's think about that. Isn't that precisely what Pugesek studied? They looked at -- isn't it the Pugesek study? They compared the viability of Tom Stehn's transects with a much more intensive sampling, which involved placement in crab pots? Isn't that part of what that research was all about?

A Ostensibly, that's correct.

Q And what they found -- and this was Dr. Pugesek as the principal author finding -- that, in fact, Tom Stehn's methodology worked just as well as crab pots that he put out,

those that Baldwin put out. They put out -- they put out crab pots, I think it was four years, and they compared those to the four years of data from Tom Stehn, and they found that Stehn's abundance measures correlated well with the more intensive trapping. We talked about that earlier. You --

THE COURT: Didn't anybody just use chicken necks and string?

(Laughter)

MR. KAHNE: I don't know, your Honor.

BY MR. KAHNE:

Q What I know is that when people who actually want to catch crabs do it, what they do is they put out crab pots, right, when they want to catch them to eat?

A And I would say -- I'll just sit back. And I --

THE COURT: Would you like --

THE WITNESS: I don't agree with that --

THE COURT: Would you like to break for the evening?

THE WITNESS: Pardon?

THE COURT: Would you like to break for the evening?

THE WITNESS: I had hoped we were done, but yes.

(Laughter)

THE COURT: How much further?

MR. FERNANDES: It looks like there is no end in sight.

MR. KAHNE: Oh, there's --

MR. FERNANDES: I'm looking at a --

MR. KAHNE: We're not done. That's for sure.

MR. FERNANDES: -- one-inch stack here.

THE COURT: I just don't -- I think he's getting tired. I'm getting tired.

MR. FERNANDES: I would prefer to break.

THE COURT: When I'm making fun of chicken necks and -- you know.

(Laughter)

MR. FERNANDES: Our preference would be to break now, given the fact that I still see a one-inch stack here.

THE COURT: Eight thirty in the morning?

Anything else to take up?

MR. MC CARTHY: Your Honor --

THE COURT: Thank you, sir. You may stand down.

THE WITNESS: Thank you.

MR. MC CARTHY: Your Honor, if I may?

THE COURT: Yes, sir.

MR. MC CARTHY: Ed McCarthy for San Antonio River Authority.

I'd like to ask the Court's permission to excuse my corporate representative, our general manager, Suzanne Scott, at the end of the afternoon tomorrow. She's got to return to San Antonio to carry out business.

We have Mr. Steve Robbie (phonetic), Director of

Policy and Planning, here --

THE COURT: If --

MR. MC CARTHY: -- and will continue to be here.

THE COURT: If that person would like to go today or in the morning, that's fine as well.

MR. MC CARTHY: Thank you. She won't be called as a witness.

Okay. Anybody else --

MR. MC CARTHY: Thank you, your Honor.

THE COURT: -- need her as a witness of any kind?

MR. UNIDENTIFIED: No, your Honor.

THE COURT: All right. Thank you very much.

(Pause; voices and whispers off the record)

THE COURT: Thank you.

THE WITNESS: Oh, I --

THE COURT: You can go.

THE WITNESS: Oh, okay.

(This proceeding was adjourned at 6:01 p.m.)

CERTIFICATION

I certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

January 23, 2012

Signed **Dated**

TONI HUDSON, TRANSCRIBER

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	)	CASE NO: CA-C-10-075
	)	
Plaintiff,	)	CIVIL
	)	
vs.	)	Corpus Christi, Texas
	)	
BRYAN SHAW, ET AL,	)	Wednesday, December 14, 2011
	)	(8:27 a.m. to 10:02 a.m.)
Defendants.	)	(10:23 a.m. to 11:51 a.m.)
		(1:39 p.m. to 2:58 p.m.)
		(3:24 p.m. to 5:38 p.m.)

BENCH TRIAL - DAY 7

BEFORE THE HONORABLE JANIS GRAHAM JACK,
UNITED STATES DISTRICT JUDGE

Appearances:	See next page
Court Recorder:	Velma Gano
Courtroom Clerk:	Lori Cayce
Transcribed by:	Exceptional Reporting Services, Inc. P.O. Box 18668 Corpus Christi, TX 78480-8668 361 949-2988

Proceedings recorded by electronic sound recording;
transcript produced by transcription service.

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Corpus Christi, Texas; Wednesday, December 14, 2011; 8:27 a.m.

(Call to Order)

THE CLERK: All rise.

THE COURT: Thank you, you may be seated. Go ahead.

MR. KAHNE: Good morning.

THE COURT: Are you ready?

MR. SLACK: I'm ready.

MR. KAHNE: At this time, your Honor, what we'd like to do is present two exhibits.

THE COURT: You can plug that in, the snack or whatever it is.

MS. SNAPKA: Thank you, your Honor.

MR. KAHNE: The first is Plaintiff's Exhibit 384 -- 384 is in evidence and what it is is comments that the Texas Parks & Wildlife Department submitted to criticize SAGES and the second is --

THE COURT: Gosh, Ms. Gano, I'm sorry.

MR. KAHNE: The second exhibit is Defendants' Exhibit 394. That's also in evidence and that is comments that Tom Stehn submitted to criticize SAGES and what we'd like to do is we'd like to ask the Court, when time permits, to read those comments rather than going through them right now.

THE COURT: We may do that right now so we'll be in the right sequence.

MR. KAHNE: We're prepared after doing that to pass

the witness.

THE COURT: You're waiting for --

MR. KAHNE: 384 is our exhibit --

THE COURT: Plaintiff and 390 --

MR. KAHNE: 394 is the Defendants' exhibit and that's the Tom Stehn comments.

THE COURT: Do you think you could find those, Ms. Gano? Do you have a copy and you'll hand them to me?

MR. KAHNE: I have 384 easily. This is not marked, right?

MR. UNIDENTIFIED: How do I know?

MR. UNIDENTIFIED: Because --

Because --

MR. UNIDENTIFIED: There's our --

THE COURT: Can you fix it at 384, Defendants' 394? Thanks, Lori.

MR. UNIDENTIFIED: 384 is one of the ones I handed you this morning.

(Discussion off the record; pause)

THE COURT: Was anything modified after these critiques were sent in?

MR. KAHNE: I don't understand the question.

THE COURT: After SAGES received the critiques --

MR. KAHNE: Okay.

THE COURT: -- were any changes made to the SAGES

report?

THE WITNESS: I don't know which critique you're talking about. We did make some --

THE COURT: Well, the two I'm sitting here reading.

THE WITNESS: -- we did, for instance, some of the concerns of Texas Parks & Wildlife. I can remember that we did modify some things but --

THE COURT: Such as?

THE WITNESS: The analysis -- in our analysis in our --

THE COURT: In what regard?

THE WITNESS: Well, I don't know which ones you're talking about. I haven't -- I mean, it's been months and months.

THE COURT: Okay, I've got the -- Mr. Stehn's comments and the Texas Parks & Wildlife comments.

THE WITNESS: Yes, your Honor, I know that but I haven't seen those to know which ones there's --

THE COURT: Okay. Go ahead.

MR. KAHNE: Your Honor, at this point, we're prepared to pass the witness.

THE COURT: Okay. And the SAGES report was all funded by Mr. Fernandes' client?

MR. KAHNE: I believe that what happened, your Honor -- but he can clarify if I'm incorrect -- is --

THE COURT: Is that right?

THE WITNESS: It was funded by four groups, the Guadalupe-Blanco River Authority, the San Antonio River Authority, San Antonio Water System and in-kind support from the U.S. Fish and Wildlife Service.

THE COURT: Okay.

MR. FERNANDES: Do you have a copy of those comments so the witness can review it?

MR. KAHNE: Do I have a copy? I have only marked copies.

MR. FERNANDES: We'll go on. We'll move forward.

THE COURT: Do you want these?

MR. FERNANDES: Please.

THE COURT: Ms. Cayce.

R. DOUGLAS SLACK, DEFENDANTS' WITNESS, PREVIOUSLY SWORN

REDIRECT EXAMINATION

BY MR. FERNANDES:

Q Let's go back and look at the Hunt-Slack 1983-84 and 1984-85 study, Defendants' Exhibit Number 381. Did you read Dr. Chavez-Ramirez's rebuttal expert report dated September 2nd, 2011?

A Yes, I did.

Q Do you recall that he described the Hunt-Slack study as one of the two most comprehensive fecal studies covering entire and multiple winters?

A Yes.
Q And yesterday do you recall when TAP's counsel questioned you for nearly two hours about Dr. Greer's study?
A Yes.
Q Let's look again at the results of Dr. Greer's study, Defendants' Exhibit 224. Now, this is what we looked at yesterday when we looked at Dr. Greer's study, correct?
A That is correct.
Q And this is presented on a monthly basis, correct?
A That is correct.
Q Now, let's compare -- now, instead of looking at Dr. Greer's study on a monthly basis, let's look at it on an annual basis and this is what Dr. Greer's study looks like, does it not, if presented on an annual --

THE COURT: Is that including the summers?

MR. FERNANDES: I'm sorry?

THE COURT: Including summers? What are you talking about?

MR. FERNANDES: No, this is the winter diet.

THE COURT: Okay. Well, we need to make that clear.

MR. FERNANDES: Okay, sorry.

THE COURT: Thank you.

BY MR. FERNANDES:

Q Now, doesn't Defendants' Exhibit 224 show Dr. Greer's results from her study concerning the winter diet during the

years 2004-2005 and I believe it's -- 2004-2005 and 2005 and 2006?

A That's correct, with 2004 and 5 on top and 2005 and 6 on the bottom.

Q Okay. Now, let's compare the Hunt-Slack study results from the winter of 1984-1985 with the Dr. Greer study results from the winter of 2004-2005.

A Okay.

Q Now, if you look at the results across the winter from the Hunt-Slack study and the Dr. Greer study, it shows, does it not, that in the Hunt-Slack study, there was 40.1 percent of the diet was blue crabs and in the Dr. Greer 43.4?

A That's correct.

Q And in the Hunt-Slack study, wolfberries were 13.7 and they were even higher at 26.2 in the Dr. Greer study?

A That's correct.

Q And --

THE COURT: That was for the one winter?

MR. FERNANDES: Yes.

BY MR. FERNANDES:

Q And clams were at 28.8 percent in the Hunt-Slack study and 20 percent in the Dr. Greer study?

A Yes.

Q And finally snails and insects were 12.5 in the Hunt-Slack study and 8.6 percent in Dr. Greer's?

A That's correct.
Q Now, if the Hunt-Slack study had been -- the results from the Hunt-Slack study had been presented on a monthly basis, wouldn't there be very few blue crabs during the number of months?
A That is correct.
Q So wasn't Dr. Greer's study results from the winter of 2004-2005 consistent --

THE COURT: Can you do this non-leading?

MR. FERNANDES: Sure.

BY MR. FERNANDES:

Q Was Dr. Greer's study results from 2004-2005 consistent with the results of the Hunt-Slack study from 1984-1885?
A Yes.
Q And are your opinions about the crane's diet also based upon the Hunt-Slack study?
A Absolutely.
Q And has Dr. Porter analyzed -- who's our next witness, Dr. Porter -- has Dr. Porter analyzed whether the cranes could meet the energy needs based upon the diet results from both Dr. Greer's study and the Hunt-Slack study?
A Yes, I'm sure.
Q Let's move to something else real quickly -- Pugesek, Plaintiff's Exhibit 204 and was that the SAGES's failure to analyze Pugesek, one of Mr. Stehn's comments to the SAGES

report?
A Yes, it was.
Q Let's look at -- have you read the Pugesek article they showed you yesterday?
A Yes.
Q Wasn't Mr. Stehn a co-author of this article?
A Yes.
Q Is this article a peer-reviewed article?
A No.
Q In your opinion based upon the sample size that Pugesek used, is this paper something that would ever pass the rigors of a peer review?
A Not only sample size but technique and methodology -- it would problematic in a peer review.
Q Now, let's look at the paragraph that TAP's counsel showed you yesterday at Page 22. Do you see here where it says, "Our study is the first to demonstrate a relationship between crab abundance and adult whooping crane mortality"? Do you see that?
A Yes.
Q Now, didn't Pugesek compare blue crab capture data from March with mortality data from across an entire winter?
THE COURT: Can we have him just testify, Mr. Fernandes?
MR. FERNANDES: I thought by saying "did" -- we

covered that point yesterday.

THE COURT: I just wanted to hear it in his own words.

MR. FERNANDES: Okay.

THE COURT: Usually if the question is calculated to give a "Yes" or a "No" answer, it's going to be leading.

MR. FERNANDES: I -- your Honor, I'll move it to --

THE COURT: Thanks.

MR. FERNANDES: I'll move along. I'll make it --

THE COURT: You know what? You can just tell me what you want me to look at and I'll do it.

MR. FERNANDES: I'll ask a question.

THE COURT: You don't even have to question him about it.

MR. FERNANDES: I'm going to be done in two or three minutes.

THE COURT: Okay, sorry. I'm sorry.

MR. FERNANDES: Okay. And that's what I thought you said -- so you could read through and you could get through and that's what I was trying to do.

THE COURT: Do it that way. That's fine.

MR. FERNANDES: Okay.

THE COURT: I like your way.

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BY MR. FERNANDES:

Q As a scientist, would you ever carry blue crab capture data from March with crane mortality data from across an entire winter?

A No. As I mentioned yesterday, there is no biological connection for events preceding the study of crab numbers in March.

Q Now, let's look at the next paragraph that TAP's counsel didn't show you yesterday. You see here where it says, "Juveniles were nearly four times more likely to die at the winter grounds than were adults. In spite of a higher juvenile mortality rate, we found no significant relationship between juvenile mortality and crab abundance." Do you see that?

A Yes.

Q Were 16 of the 23 cranes that TAP alleges died during the winter of 2008-2009 juveniles?

A Yes.

Q And finally, yesterday do you recall discussing that the vast majority of blue crabs that Dr. Greer captured as part of her study were less than 30 millimeters?

A Yes.

Q Why was that blue crab capture data used when trying to determine blue crab abundance at Aransas as part of the SAGES study?

A It's a very important question. The SAGES study was to look at the ecosystem of the marsh system at Aransas National Wildlife Refuge. Part of that was to study blue crabs in that system, to study the population of blue crabs. The population of blue crabs is comprised of not just large blue crabs. The nursery -- what we all know and all of us believe that a marsh ecosystem is the nursery for an awful lot of organisms that are found in an estuary. That population of crabs in the estuary is made up of all size classes. In fact, if I was a little crab, that's where I would be in that marsh to be protected from foraging by gulls and egrets and cranes.

So when we look at a population, I -- this population is comprised of mostly young crabs in smaller size classes in a population and there's horrendous mortality on crabs. Everybody loves them and so it doesn't surprise me that when one traps in the marsh using the trapping scheme that Daniele Greer used that you would find a predominance of smaller size classes. That's what's there and they are all a part of the crab population which is all a part of the trophy functioning of the salt marsh at Aransas National Wildlife Refuge.

Q After Mr. Stehn submitted his comments to SAGES, did you meet with him?

A Yes, we did.

MR. KAHNE: Your Honor --

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BY MR. FERNANDES:

Q Did he --

MR. KAHNE: Your Honor --

THE COURT: Yes.

MR. KAHNE: -- I'm going to object if he's going to go into hearsay with Tom Stehn.

THE COURT: Sustained.

MR. FERNANDES: I didn't --

BY MR. FERNANDES:

Q What did you tell Mr. Stehn?

MR. KAHNE: Your Honor, that's awfully close here.

THE COURT: So where -- sustained.

MR. FERNANDES: Pass the witness.

MR. KAHNE: No further questions.

THE COURT: Thank you. Call your next witness.

(Witness stepped down)

MS. ROBB: Defendants call Warren Porter.

WARREN PORTER, DEFENDANTS' WITNESS, SWORN

THE WITNESS: Thank you.

DIRECT EXAMINATION

BY MS. ROBB:

Q Please introduce yourself to the Court.

A My name is Dr. Warren Porter.

Q Dr. Porter, let's talk about your background. Please take a look at Defendants' Exhibit 420. Is that a true and correct

copy of your CV?
A Yes, that is.
Q Can you briefly describe your educational background?
A Well, I got my bachelor of science degree in zoology at the University of Wisconsin Madison and then I went to UCLA, the University of California at Los Angeles, for my advanced degrees, the first in -- my master's degree in ichthyology which is the study of fish and then I got my PhD in physiological ecology and again at UCLA.
Q And what is physiological ecology?
A It's the study of how physiology influences the ecology of organisms and the interactions between them and their environment.
Q You also studied biophysical ecology?
A Biophysical ecology is more the physics and the heat and mass transfer engineering applied to animals in their natural environments.
Q What is your current employment?
A I'm currently a professor of zoology at the University of Wisconsin in Madison. I'm also a professor of environmental toxicology at UW Madison. I'm an affiliate faculty member in engineering physics at UW Madison and I'm also affiliated with -- affiliated faculty member of Nelson Institute for Environmental Studies.
Q And what do you do in these positions?

A A lot of research and a lot of teaching and outreach and public lectures.
Q Did you have a chairmanship position at the Department of Zoology?
A Yes, I was chair there for five years. That was a wonderful growth experience.
Q I notice you do a lot of interdisciplinary research. What are your qualifications for that?
A Well, after I finished a post-doctoral fellowship with a physicist-turned-botanist at Washington University for a couple of years and I was very much interested in how does the physical environment influence animals and what they do and where they live and so when I came to Madison as a new assistant professor, I decided that I needed to take some additional courses and so I began to work my way through mechanical engineering curriculum and then I took courses in chemical engineering, experimental design and statistics, advanced statistics, advanced mathematics, micrometeorology courses, solar physics courses and then as we moved into doing landscape-scale stuff, I realized I needed courses and training in remote sensing and satellite imagery processing and a series of other courses that basically total about -- let's see. It's about 43 courses in about 17 different departments.
Q Are you still taking classes?
A Oh, yes. I'm in my second semester of an advanced 3D

animal -- art animation course which allows me to draw three-dimensional animals and then animate them and then put them into computational fluid dynamics and the animal that we're really working on in that context right now is Leatherback Sea Turtle and trying to understand how do its -- how does its body shape and the water-temperature requirements it has -- how does that constrain distribution in the oceans.

Q Let's talk about some of the recognition you've received in your work. You've listed that you were a Guggenheim Fellow. What did that involve?

A Oh, that was an opportunity really to have a year of my teaching to really focus on the development of the first parts -- the first major parts of Niche Mapper for the microclimate model development and the ectotherm, or cold-blooded animal model development.

Q And what is Niche Mapper?

A Niche Mapper is a set of programs that allow me to -- and other users who have either collaborated with me or have purchased the software -- to calculate basically the food and water requirements for any kind of animal anywhere on the planet.

Q You've also listed that you were named one of the top five researchers for DOE's Ecological Research Division. What did that work involve?

A That was a lot of fun because that was a time when we were

developing the porous media model to allow us to start modeling warm-blooded animals. So it was a model basically of fur and feathers, a mechanistic model.

Q And I see also that you have a classic paper listed, "Thermodynamic Equilibria of Animals with Environment." Tell us about that.

A That was a big surprise. I didn't find out about it until after the book was published and somebody told me it was in there.

Q And what does that paper address?

A That really was the seminal paper that defined the early stages of animal environment interactions in a quantitative biophysical way.

Q Did you take another sabbatical after the Guggenheim that allowed you to expand the model?

A Yes. I had an opportunity -- actually invited to apply to the National Center for Ecological Analysis and Synthesis in Santa Barbara and that was a glorious sabbatical year. It was a point where we had really matured the models but now I was trying to figure out how do we go from a single, local site simulation to something much broader at a regional or continental or global scale and NCEAS, which is the acronym for this top -- this is the premier ecological think tank in the world actually and the opportunity here was really enhanced because they have a fabulous computer setup there and people to

man it and I started talking with the head of that computer systems thing and talking to him about how do I go global from local and he pointed me toward Pearl and MySQL databases and that was the beginning of really being able -- I'm sorry -- to go global. I've got to keep my hands away from this microphone. I apologize, your Honor.

THE COURT: It's a common mistake for all of us.

BY MS. ROBB:

Q Please turn to Page 2 of the CV. I see that you were invited by the National Academy of Sciences to present at the Sackler symposium in 2008. What was the topic there?

A The topic there that I talked about was biogeography, changing climates and niche evolution and this was a chance to showcase our latest developments which allow us basically to design animals or to ask what is the consequence of changing your shape or your size in terms of how you interact with the physical environment and how is that going to affect how you're going to function under future climates.

Q And underneath that, what is the Irving Scholander Lecturer of the Year in Alaska?

A That is the top recognition for a person working in the area of physiological ecology. This is populated mostly by national academy-type people. They do a global search each year for who is on the cutting edge and then they bring that person in all expenses paid for a week of lectures and

interactions with the faculty and students. That was a very exciting experience.

Q And what are you presenting at the Gordon Conference in 2012?

A Ah, there, that's very exciting because I'm going to be giving -- actually be involved in two papers. One, I'm doing a -- invited distinguished lecturer on ecological energetics and then my wife and I are presenting a paper on metabolomics because of the work that we're doing to understand how do very, very complex biological systems, especially biochemical systems in the body, how they all interact and how do they work and that is going to be up in Biddeford, Maine. So I've never really been there but I'm looking forward to that trip.

Q In addition to your research --

THE COURT: It's really pretty.

THE WITNESS: I --

THE COURT: You'll like it.

THE WITNESS: -- I hear it is. Yes, thank you.

THE COURT: So what group is there?

THE WITNESS: This is at a university-type environment but I don't know anything really about it other than it's gorgeous and a lot of very really exciting people are going to be there to talk to each other.

THE COURT: Is there a branch of University of Maine there?

THE WITNESS: I believe there is but I'm not certain.

BY MS. ROBB:

Q In addition to your research, you had said you had been teaching all your professional career. Have you won any teaching awards?

A Yes, I've won a number of awards but that first one listed there is the one I'm most proud of. When I was offered one -- actually I had three different job offers there in Madison and I chose to teach Zoology 101 which has a thousand students in it and the second year I taught that, I was able to win this award. We got fellow students talking to each other and interacting with me almost as though it was a classroom of 12 or 15 people but I was looking at 500 at a time, half in the morning and half in the afternoon three days a week and it was very exciting and I taught that all the years I've been at Madison. That's my primary teaching obligation.

Q Let's look at Page 3 at the CV. Dr. Porter, you've listed a number of patents that you hold. Please describe the 2006 patent which is Number 2 on your list and highlighted here entitled, "Method and system for calculating the spatial-temporal effects of climate and other environmental conditions on animals."

A This was done for several reasons. The software development that we had for Niche Mapper was at a point where everybody was saying, well, how does all this work because we

not only have energetics in it but we allow animals to move around in the environment, to choose their local microenvironments if it gets too hot or too cold. If they can go below ground, they go below ground and if it gets too hot or too cold, all kinds of things and so this was a way to document it in excruciating detail of how everything was fitting together.

The other patents on here, while they're not highlighted, actually represent another aspect of a very important related research where the first one there we got back in 1994. The "Passive monitoring of health with stable isotopes" -- what this does is allows us to detect within two hours of onset an infection noninvasively by sampling breath and this all came about because a few years before that working with a couple of -- with Mark Cook and Isabel Treichel who are co-inventors here, I wanted to be able to go into the field and pick up an animal and do something noninvasive to it like to sample its breath and determine, are you getting enough food or not or are you sick or both and so this was a technology that would allow you to do that.

And then the others were, in a sense, a follow-on to this are you sick or are you not sick kind of thing because it turned out that my wife, who's a biochemist, had at that point with her brother developed a technology to sample it. Fifty microliters of blood put into an NMR tube, a nuclear magnetic

resonance tube, nuke it and then watch the signals of all the molecules in there and if you take samples of fluid through time and an organism that you've induced a synthetic infection or a benign infection and then watch how it responds, you can actually determine what are the biomarkers that biochemical molecules in the body that are changing in time. It's sort of like playing a piano where you're playing chords and as you progress through a piece of music, you know where you are in the music.

Well, this is directly analogous to that because we're really looking at the voices of the molecules and some of them are screaming loud and some of them are very soft and then later on in time, it's shifted and you get a different pattern and so this allows us firstly with a breath sample to say, are you sick and then follow on, where are you in the infectious process.

Q So the 2006 patent for the method and system for calculating spatial-temporal effects of climate on animals, is that the Niche Mapper patent?

A That is the Niche Mapper patent, yes, thank you.

Q And does that patent cover future enhancements of Niche Mapper?

A Yes, it does. It's broadly defined and allows us as we continuously make improvements to add to them and have them covered in the patent.

Q About how many species have you studied with Niche Mapper?
A Over a hundred.
Q Can you give us a flavor for the kinds of species you've studied?
A We -- well, we started out a long time ago with desert lizards of about maybe 10, 15 different species. Then we began almost in parallel with that to look at amphibians and how do they work because they've got a wet skin instead of a dry skin like lizards and just recently, we published a paper on that showing that when we put radio transmitters on frogs, we can actually predict where they're going to be in the environment, how they're going to move around in the environment, what they're going to select.

We showed we'd not only predict that but predict their body temperatures and their water-loss rates and we had models of them -- non-animate, artificial models, if you will, that had the same solar properties and other properties where we could monitor water loss and so we were able to show that we can do the full metabolic rate and water loss and habitat utilization and movement in the landscape and we could predict those beautifully with Niche Mapper whether you were in a meadow or shrubs or forest or another habitat.
Q Can you give us an idea of some of the other species that you studied with Niche Mapper?
A Oh, yeah, I'm sorry. I got carried away here. Yeah, I'll

do that. We did and once we got the fur model going, we decided first to try it out with mice of various kinds and then went to Alaska -- yeah, the North Slope actually for some vole studies in the winter and the spring. We've done the Serow deer which is an endangered species in Japan and showed that we could predict 99.9 percent of the habitat that it was utilizing there throughout the year. We could do that because the Japanese go out there and they look at every single square kilometer of their island and they know where the deer are. It's unbelievable the data that they have there.

For birds, I began to work with Hawaiian honeycreepers in Hawaii because they're endangered and the Po'ouli in particular was threatened with extinction and they wanted to know where can we find it. Where is it likely to be because those honeycreepers were clobbered back in the 1800s when ships brought mosquitoes in that were carrying avian malaria and the malaria was just totally devastating to the native flora -- the native fauna, the birds -- killed them almost all off in the lower elevations but the mosquitoes couldn't fly above 3,000 meters and so the birds moved up there but this was a huge expense because it was colder. So they needed more food and the rich insect wood was down low -- was no longer up there. I mean, it wasn't at the high elevations. All they had was snails up there which had a very different kind of nutritive value. They were very high in water and very

low in protein.

So the birds were compromised in a dual fashion there and we were able to predict the only three known locations that are habitats where they were actually up on the mountain using Niche Mapper and we also were able to show that if we did the past climates back in the 1800s that they -- we could -- we predicted where they should be in the lower elevations and just by happenstance, somebody a year later doing fossil studies on the same island of Maui uncovered fossils of this exact bird that we'd been simulating and so the ancient distributions matched beautifully with what our back-casted simulations were showing.

Q Over what period of time have you been working with the model?

A Well, actually it even started with my PhD work with Ken Norris. So that was about 1964.

Q And have you granted licenses to other academics to use Niche Mapper?

A Yes, I have.

Q And can you give us a flavor for where Niche Mapper is being used by license?

A It's being used essentially on all continents except Australia -- I'm sorry, not Australia. I mean Antarctica because one of my primary collaborators is Michael Kearney in Australia and we've done a number of papers together but

essentially on almost all the major classes of vertebrates and an invertebrate species, a mosquito that carries a disease and we were able to show in that one that we can predict mosquito distributions now and then we also were able to look into the future and ask how does climate change or how does evolution in terms of resistance to warming affect mosquito distributions and then we were also able to put them together to -- and then we also happily -- because we were collaborating with some Dengue Fever experts, we were able to also show that we could pinpoint where Dengue Fever should be appearing in Australia and we had the field data to verify that.

Q So the model is being used by license in Australia. Where else?

A South Africa, tsetse flies which carry sleeping sickness and climate change and how that's going to affect tsetse distributions because there's going to be a big change in the water distribution in Africa and that's going to impact this a bit. I have collaborators in Spain and France, Oliver Borde who's working on pit vipers and Michael Grimier -- David Grimier -- sorry -- who's working on Little Auks in the Atlantic and guiamonts up there. Those are two in Europe. I had just got a new invitation from somebody up in Finland who wants to work on butterflies with this.

In Asia, we have Yoji Nattori on Honshu in Japan who's wanting to use this more on the Serow deer work and let's

see. In South America, we have Francisco Bozinovic who is working on high altitude small mammals and how a climate change is going to influence their distributions and his students and there's some people in Argentina who want to work with me but I haven't been able to get to that yet.

Let's see. That's the -- in North America, I have a series of people, Harvey Lillywhite at the University of Florida who wants to use this on copper -- water moccasins. Let's see, University of Illinois -- I've forgotten the student's name now but he wants to work on bird communities in Central America and how pesticides and other things might be affecting them and also how climate change might modify them. Those are a few.

Oh, yes, several in Australia. At Perth, Australia at University of Perth, there's Nikki Mitchell and I'm working with green sea turtles with her, with Michael Kearney in Adelaide -- I'm sorry, Melbourne. We've been -- you know, we did marsupial gliders and predicted body size distributions of species with them, also the brown butterfly showing that man -- human warming-induced local microclimates around cities were changing. The phenology of emergence of butterflies, it was -- that was exciting because that was the first demonstration of human-induced local climate warming and how that -- was it changing the pattern of activity and the phenology of the life cycles of butterflies.

Rare and endangered koalas and kangaroos are both projects I'm also working with Michael Kearney on. I'm working with Mariana Fuentes up in the northeastern part of Australia on another -- on a green sea turtle nesting habitat and how that's going to be influenced by climate change. Those are some of them.

Q Do you incorporate the enhancements as a result of the work of these collaboratives?

A Oh, yes, I feel that's very valuable because when you have independent looks by people who aren't working with it all the time, you get fresh views and I learn a lot from those people and we incorporate -- in fact, especially with Michael Kearney who uses the software and has all the codes. He and I interact with each other all the time and we're developing this for more common uses in high schools and other universities where it'll be very easy to access for people.

Q And when you grant a license, do you train the people who are going to be using the model?

A Yes, we do, usually depending on their level of expertise, one to two weeks at least. The gal that's working with tsetse flies, for example, came up to Madison for two weeks and we showed her the whole thing. Oh, I forgot that I have a student from -- a postdoc from Taiwan. Taiwan paid -- is paying for two years of postdoctoral work for her to come and work with me because she's working on high-altitude vipers that are rare and

endangered and also certain rare species of lizards, skinks and how are -- how is their -- in their national parks and in their other places in Taiwan, how are -- how is climate change going to influence their life cycle and their survivorship.

Q Dr. Porter, you've trained many students over the years in your area of expertise and you've listed 32 students on your CV who've worked with you and some of their accomplishments. Can you give us just a flavor of the breadth of those briefly?

A Yes. Dick Tracy there -- C.R. Tracy, he was my -- actually my very first graduate student and he was the one who started off -- I had been starting to work on amphibians and he was interested in that. So I just handed him that project and he ran with it and did a -- really a classic paper all on his own. He also got a Guggenheim Fellowship and he's currently director of the Biological Resources Research Center and Ecology, Evolution and Conservation Biology program at the University of Nevada Reno.

Also on the next page there, a couple of -- right near the top there, Tom Daniel and Joel Kingsolver. Those two guys were in my lab at the same and they were just amazingly fun people. Tom, after he worked with me, went to Cal Tech on a Bantrell Fellowship for two years and then he won a 600-person competition for a faculty position at the University of Washington in Seattle. He won a MacArthur Foundation Fellow award in '95 and is currently an endowed chair at that

university. He was -- he has been also their department chair for five years. He recently stepped down from that job and then Joel Kingsolver who was in my lab at the same time also got hired at the University of Washington Seattle just about a year after Tom. I guess they liked Tom so well and Joel had all kinds of wonderful characteristics on his own and ultimately University of North Carolina Chapel Hill lured him away from Seattle by giving him an endowed chair and so those are just two examples. Joel works on butterflies. Tom Daniel is fluid dynamics and motion of animals but he's just incredibly bright and, you know, they're both very, very broad and competent technically.

Q Please turn to Page 5 of the CV. You've listed your current graduate student Megan Fitzpatrick. How did you come to study whooping cranes?

A Oh, that was purely serendipitous. We had been doing some work on birds. We've done the Po'ouli. We were working with our French collaborators on birds of the North Atlantic who basically spend their whole lives at sea and then Megan applied actually to the Nelson Institute and she heard about me and she had -- at the time she applied, she'd been up at the International Crane Foundation in Baraboo for a couple of years working as an intern-volunteer up there and she contacted me and she said, "I've heard about your Niche Mapper and I'd like to know if you'd be interested in trying it out on whooping

cranes" and I said, "Wow, I'd love to."

Another endangered species and that's really one of the major features and attractions for me is -- for Niche Mapper is applying them to these kinds of situations and so we were working on whooping cranes for about a year and then we were contacted because apparently somehow or other it was in the -- on the web and somebody found out about it and then we got involved here and it was a wonderful opportunity because what we were focusing on initially was what's going on in Wisconsin and Wood Buffalo and where can we use the model to create new successful sites for the birds because climates were going to change and they were trying to establish a flock going from the Necedah Wildlife Refuge in Wisconsin down to the Florida area and they really -- some of the researchers there at the Crane Foundation really wanted to know can we predict migration times and can we predict what would be the best places for cranes to go.

And so -- also I was very concerned about how do we define the food intake of these birds and Megan had been doing already significant amount of field research right there both at the Crane Foundation where they actually have -- I have to describe -- pardon me. I have to describe the Crane Foundation a little bit so you can understand the tremendous asset that that place represents. They have huge enclosures outdoors which basically are chicken-wire enclosures and then there's

giant bird netting across everything to keep the cranes from flying out and to keep predators from getting in and you can basically walk up the edge of the fence and watch these birds doing everything they do on a daily basis, I mean, how they're feeding, what their behavior patterns are, how they interact with the other birds in their pen.

And they have so many different species of cranes there that when one kind of species starts up, another group answers them but a different species and it's just really -- all kinds of really fantastic things are going on there but especially the opportunity to look at cranes, you know, from 5, 6 feet away. It's incredible to see the different behavior patterns they use in feeding. They feed them corn and other dry foods mostly and then they have watering thing there. So you can watch them feeding and --

THE COURT: Where is that located? Is that the Patuckson (phonetic)?

THE WITNESS: It's just south of Baraboo out in the country, rolling meadows --

THE COURT: Oh.

THE WITNESS: -- and fields and forests. So anyway, one of the things that I was told right away is don't -- just like don't touch the microphone here, they said, don't ever pick up a feather because if you pick up a feather, you're going to be in violation of the Federal statutes and so I

couldn't touch them but the staff there could and so we made collaboration agreements setting up with some of the people there at the center who would be on Megan's committee and myself and we worked with them to set up protocols because I wanted to know what are they eating and how much -- how frequently are they consuming food and can we build a model that will project and predict how much food they should be eating and then we've got the experimental data right in front of us to confirm that.

And so that was the beginnings of a serious effort by not only Megan but they directed other interns to help her too so that we could collect data on multiple pairs of birds not only right there at the wildlife center and crane foundation but also over in Necedah where the birds come for summertime to lay their eggs and to raise their chicks and so it was an ideal situation, local controlled environment and a field environment where you're not supposed to get within -- I don't remember. I think it's a quarter of a mile. That's the closest that they're allowed to approach the birds over there.

And so working the two together, you can get data that would -- that complement each other and then we were doing -- going to be doing the modeling too. So we'd be looking at both what are the birds doing that are up north feeding on tubers and feeding on frogs and minnows and dragon flies and acorns and then what are they doing -- and then when this came

along, the trial, and the opportunity to get data from Aransas, it was a gift from heaven.

BY MS. ROBB:

Q Please turn to Page 9 of the CV.

THE COURT: So you were hired to get data for the trial?

THE WITNESS: Oh, let's see. No, I was hired to develop a model and one of the first things I --

THE COURT: By whom?

THE WITNESS: I'm sorry?

THE COURT: By whom?

THE WITNESS: By the Defense.

THE COURT: Who -- the -- there are intervenors and there are -- who?

MS. ROBB: By GBRA -- Intervenor Defendant GBRA.

THE COURT: Okay, the intervenors.

MS. ROBB: Right.

THE COURT: And who were you hired by them?

THE WITNESS: I'm sorry. I don't understand.

THE COURT: Who were you hired by?

THE WITNESS: Let's see. What -- it was about a let's see. It was about a year ago I think -- a little bit more than a year ago I think. Yeah -- no, it was about a year ago roughly, yeah, just about a year ago. One of the things we needed to do was to get the properties of the birds for the

model and to verify that we could do anything and the first thing I said to them was, I don't want to be constrained in terms of what we do and if you'll agree to giving me complete freedom not only to do the research, to gather the data and to publish, then I'll agree to work with you but I was concerned initially about -- because I didn't know anything about how all of this worked. So I didn't want to be hobbled or feeling that I was constrained to do research independently.

THE COURT: So have you -- you haven't actually studied whooping cranes in the wild. You developed a model that fits to the whooping cranes in the wild?

THE WITNESS: Well, actually, I haven't done studies of whooping cranes in the wild. I've only seen them at the International Crane Foundation but my --

THE COURT: Okay, in captivity?

THE WITNESS: Right. My student is the one who's seen them in the wild, Megan, because she's been working with them at Necedah.

THE COURT: Is she here? Is she going to testify?

MS. ROBB: No, your Honor.

THE COURT: Okay.

BY MS. ROBB:

Q Dr. Porter, your current graduate student Megan Fitzpatrick's work that you described at the International Crane Foundation predated your being hired for this --

A That's right. That's right, predated by more than a year.
Q Okay.
THE COURT: So has she studied them in the wild here in Aransas Wildlife Refuge?
THE WITNESS: No, she has not. She's only studied them in Necedah.
THE COURT: In the wintering grounds?
THE WITNESS: In the summering grounds in Necedah.
THE COURT: Where is that, Necedah?
THE WITNESS: Wisconsin. I'm sorry. It's kind of north central Wisconsin, a little bit to the west of center.
BY MS. ROBB:
Q Dr. Porter --
THE COURT: So she's only studied them in the summer?
THE WITNESS: Only in the summer.
THE COURT: So what are we -- what is this about?
BY MS. ROBB:
Q Dr. Porter, could you explain --
MS. ROBB: Well, your Honor, the work that predated this case was done in Wisconsin where there are two facilities, the International Crane Foundation where there are --
THE COURT: They're in captivity.
MS. ROBB: -- captive birds and you heard from Dr. Archibald and then there's also Necedah in Wisconsin. As Dr. Porter was saying, the birds there are in the wild and that

is a flock --

THE COURT: And their diet is totally different than what it is in the wintering grounds?

THE WITNESS: That's right, pretty much. There's no -- it's sort of down south there, they've got a salt-water-type diet and up north, they've got a freshwater-type diet. They're eating tubers and different things.

THE COURT: So --

MS. ROBB: And I see your question. I understand better.

THE COURT: I'm just figuring out what the relevancy is --

MS. ROBB: Right.

THE COURT: -- to this.

MS. ROBB: Right. We're going to talk more about the model and --

THE COURT: Get there quickly.

MS. ROBB: What Dr. Porter has done is taken Niche Mapper and run data from the Aransas feeding observations and fecal studies.

THE COURT: What data did he use?

MS. ROBB: He used Hunt and Greer.

THE COURT: Oh, okay, got it.

MS. ROBB: Thank you.

THE COURT: I see where we're going with this.

MS. ROBB: Right.

THE COURT: Moving along.

MS. ROBB: We are moving along and we are about finished with his qualifications.

THE COURT: If Greer's information was all incorrect, half of it for a year anyway, would your model change?

THE WITNESS: No.

THE COURT: It wouldn't?

THE WITNESS: No.

THE COURT: You didn't use her information at all?

THE WITNESS: No, we used it. What we -- and we'll get into that because what I wanted to do was to get rid of the bounding conditions, what are all possible possibilities in turns of diet and how would they affect the energetics and behavior of the birds.

THE COURT: Okay.

MS. ROBB: Your Honor, we're almost complete on the CV.

BY MS. ROBB:

Q Could -- let's turn to Page 9 of the CV and, Dr. Porter, can you talk about the work that you're doing with the National Science Foundation that you've listed there?

A That's interdisciplinary research that I was invited to participate because of my multidisciplinary training and basically they wanted to know where should we be going and how

should we be allocating our resources.
Q And let's turn to Page 10. What other federal governmental agencies have you worked with?
A The EPA I've worked with in terms of being a panel member and also advising them on future funding.
Q And you've also worked in your home state, Wisconsin, correct?
A Yes. I've worked both with the Department of Public Health and the Department of Natural Resources, first in biological effects of groundwater contamination and then also -- that's with both agencies and then also with the natural -- Department of Natural Resources, I've been working with them lately on climate change and how that's going to affect the wildlife of Wisconsin. We're just finishing up a white tail deer study showing how white tail deer all the way from Lake Superior down to the Illinois border -- how they're going to be impacted by climate change.
Q Looking at Page 25 of your CV, you've listed -- I numbered a hundred and seven papers that you've authored there and you color-coded the list. The white-coded papers are under the heading Energetics, Behavior Distribution, Climate Change Effects on Vertebrates and Invertebrates. What is energetics?
A Energetics is basically a study of how much energy does it take to survive in an environment, how much food and water do you need, what kind of activity patterns you have, are you

getting sunlight to warm you up or you don't need it and you're nocturnal animals, that kind of thing.

Q And the white-coded papers range from 1967 to 2010. What do these papers signify to you?

A They're -- in a sense, they're kind of a logbook of all the field research we've done and the advancement of the models from bare-skinned, cold-blooded animals -- first they have dry skin, then wet skin, then into fur and feathers and all those were single site and then lately simulations and calculations for global kinds of distribution limits and how is climate change going to modifying the distributions and behavior of cold-blooded and warm-blooded animals, both vertebrates and insects --

Q And --

A -- butterflies too.

Q Excuse me. I'm sorry I interrupted. And are there -- are any of your hundred and seven papers listed peer-reviewed?

A They're all peer-reviewed.

MS. ROBB: Your Honor, Defendants offer Dr. Warren Porter as an expert in the physiological and biophysical ecology of animals and their environments at local and landscape levels.

MR. BLACKBURN: No objection, your Honor.

THE COURT: He's accepted as that, thank you.

//

BY MS. ROBB:

Q Let's talk more about your Niche Mapper model, Dr. Porter. This is the model that you used to reach the opinions you're giving today, correct?

A That is true, yes.

Q What is the purpose of Niche Mapper?

A Niche Mapper's purpose is basically to provide a quantitative -- a means of quantitative assessment of how animals are constrained by their own properties and the environments that are available to them so that we can calculate their food and water requirements, their behavior patterns, their habitat usage, what kind of habitats do they need and their distribution limits now and in the future and we've also been able to sort of validate it by going back in the past and using fossil data and also microsatellite genetic markers to predict past distributions as well as current and future distributions.

Q And what do you mean when you talk about an animal's energy balance?

A An animal's energy balance is -- well, there are two kinds of energy balance. There's a heat energy balance which is where I started and then there's also a mass energy balance, a chemical energy balance actually. The heat balance is the centerpiece in a sense because what the model does is to say what does your metabolic rate, that is, your heat generation

rate, have to be to keep your core temperature where you want it given the environment that you're in. So as it gets colder, for example, your metabolic rate has to go to keep you warmer and if it gets hotter, your metabolic rate goes down. Now, there's a certain minimum that is present because you've got to keep yourself alive. Your heart has to keep pumping and stuff. I'm not sure that I've answered that properly or correctly or completely.

Q Well, you can add something if --

A I kind of lost my train of thought there for a minute. I didn't get too much sleep last night. Sorry, I'm little under the weather here.

Q What are the key elements of Niche Mapper?

A The key elements is a microclimate model and an endotherm model.

Q Let's look at Defendants' Exhibit 215. Can you describe the purpose of the microclimate model in Niche Mapper?

A Yes. Basically the microclimate model is a way of translating airport weather data like air temperature, wind speed, humidity which is measured at two -- at 6 feet above the ground to reconstruct the local microenvironments which are represented -- can I write on this? I guess I can't. It doesn't show up.

THE COURT: You can. You can do it with your fingertip.

THE WITNESS: I'm doing it with my fingertip but I don't see anything happening here.

THE COURT: See it with the red --

THE WITNESS: Oh, there it goes. Oh, it's showing up now as red. This is an air temperature profile. The air temperature changes at two -- at a six-foot height and is a certain value but as you get down near the surface of the ground, which is much warmer, the air temperature changes. The same way for air velocity and I'll draw right here -- that shows, I guess, yeah, the dots that are showing up over here on the left. You can see how the wind speed goes from a high value up at 6 feet high and it goes to zero at the ground surface and the shape of that means that if you're an animal and your average height -- let's say we're talking about the bird here. We would say to the program, I want to know what is the typical air temperature and wind speed every hour of a day for this bird in a marsh-type setting. I want to know what the ground temperature is and I want to know what the temperatures are below ground. I don't know if this is working very well. I'm pushing on it but maybe I'm not pushing hard enough but there are some things showing up a little bit here. If I had a laser pointer, maybe I could make it -- would that be easier for you, your Honor?

THE COURT: It doesn't -- either way. I think there's one sitting up there.

THE WITNESS: This here?

MS. ROBB: Do you have one?

THE WITNESS: No, I don't have one.

MS. ROBB: May I approach?

THE COURT: Please.

(Counsel approached)

THE CLERK: Well, someone took the Court's.

THE COURT: Okay. Then somebody has the Court's laser pointer. I knew it was going to be Mr. Fernandes.

THE WITNESS: Excuse me. There, I guess this -- give you that one back. Okay, here we go. Now, let's see. Oh, yes, here we go, all right, great.

So we're really dealing with air temperatures changing, ground temperatures changing on an hourly basis. We're dealing with wind velocity changes and in cases of the whooping cranes, unless they're laying down on eggs, they are always standing up and so what we do is we know the total height of the bird. We know the average height of the bird. So we'll say to the program, what is the wind speed and what is the air temperature at that height and then we can use that as an average for the whole animal and compute the heat that is being absorbed from the sun, the radiation being reflected from clouds that's being absorbed by the bird -- and actually I'll show you that some more in detail but basically the microclimate model is a way of specifying the hottest and the

coldest local microenvironments.

For this particular drawing where there's no trees or other kind of shade, there's not much -- many places they can go to get shade and so they're pretty much out in the open all the time but if you had shade available, then it would calculate the warmest and the coldest environment available for that hour wherever you are. So what we're trying to do is bound the environmental circumstances of the crane.

Q You said there were two key elements of Niche Mapper, the microclimate which we just discussed and the endotherm model. Let's look at Defendants' Exhibit 421.

A Yes. Now, here we have a rendition or representation of a whooping crane right here and we've explicitly stated what are the inputs for heat to the bird for the heat balance. We've got reflective sunlight from clouds, direct sunlight, reflected sunlight from the ground. We've got infrared radiation from the ground, infrared radiation from the atmosphere. We've got wind blowing across it to cool it off. There'll be a little bit of evaporation from it. Let's see, yeah. And then the bird itself is losing heat not only to the wind but also it's emitting infrared radiation just like all of us are. We're all radiating it at about a hundred watts intensity.

And what you can't see here is the heat generation by the bird inside the body which is another source of heat and so the question is given the environmental conditions, the

properties of the animal, what does that heat generation have to be -- what does that furnace have to be burning in order to keep that bird's body temperature where it wants. Now, a fire requires -- it requires fuel and it requires air and so the bird has to take in a certain amount of food and air to keep that fire going and then it breathes out air and loses water as well as CO_2 and there's also fecal losses right here.

So these are basically chemical energy balances for the food and air whereas the rest is heat energy balance and so we solve both the heat energy balance and the mass energy balance simultaneously that has to occur between an animal and its environment for that animal to maintain its body temperature.

Q So in using Niche Mapper to study the whooping cranes, what are the categories of data that you collect for the model for inputs?

A Okay. If we could go to the prior slide, please, I -- we can see that very quickly. We need to know what is the latitude and longitude and the elevation because that tells us how we can calculate the direct solar radiation that way. We need to know certain climate variables. We need to know the air temperature at 6 feet, the wind speed at 6 feet and the humidity at 6 feet. We need to know the ground surface reflectivity and the soil properties. The soil properties would be thermal conductivity, density and specific heat and

then what the program does is it calculates the minimum and maximum shade microclimates for every hour of the day for every day that we simulate.

Q And you did this Aransas specific?

A Yes, yes.

Q Let's go to the next slide, 421, Defendants' Exhibit 421 and for the endotherm model, what inputs did you have to collect in categories?

A Okay. We needed the solar radiation, that is, the reflectivity of the feathers. That's a key variable because there's a lot of energy coming in from the sun. We did that by going to the International Crane Foundation. We arranged ahead of time to have technicians handle the birds and we also needed to know the morphology of the birds. We needed to know the length of the neck, the diameter of the neck, the length of the legs, their diameter, the diameter of the body and its length. We needed to know the depth of the feathers both in the belly and on the back and we needed to know the length of the feathers in the belly and the back and then I brought along my portable spectrophotometer.

So we were able to measure the reflectivity of the bird feathers as they were on the bird while the technicians held them and then any other data we needed like -- well, we also got core temperatures form the live birds and then other data that we would need came from the literature.

Q Let's discuss the food data that you used as inputs. Is there anything else that you want to add to the collection?
A No, I think that's it.
Q Let's discuss the food data you used as inputs into the endotherm model. How did you identify food types for the whooping crane?
A We went to the literature.
Q Let's take a look at Defendants' Exhibit 378A. This is a pie chart that we've seen before summarizing the actual whooping crane diet by Hunt during the winter of 1983-84. Are you familiar with this data?
A Yes, I am.
Q And this is --

THE COURT: How did you pick this -- these -- the Hunt and the Greer out of all the literature?

THE WITNESS: Largely thanks to the -- once we got involved in the case -- this was done while we were employed -- or while we were developing the model and it came from Dr. Slack mostly and other people who --

THE COURT: So your -- the people who paid you actually told you what to use?

THE WITNESS: They gave me part of the data that we used because we also did extremes of data --

THE COURT: Well, they said, use these two studies?

THE WITNESS: No, no. They didn't say -- these are

just some of the ones that are available and so --

THE COURT: I know but why did you pick these two?

THE WITNESS: Because I think that they are the best sets of data. We had observational data initially. I knew about Greer's stuff because Megan was working and she knew about Greer's stuff because apparently Greer was also at -- anyway, we felt that because they were doing behavioral observations already because Megan was, we'd go with the behavioral observations first and then later on we decided, well, we should have another kind of data input, namely fecal data, because we know for sure that whatever we see in the feces they've eaten and so I wanted to have some realistic kinds of diets as well as a series of hypothetical diets that we would do to examine what are all the possibilities.

THE COURT: Okay, I got it. Thank you.

BY MS. ROBB:

Q All right. So this is Hunt '83-'84 based on fecal analysis?

A Yes.

Q And how did you use Hunt's first year of data in the model?

A We simply took the percentages of each of the diet types here.

Q Let's look at Defendants' Exhibit 212. This is a table entitled, "Compositions of Food Items Used in Whooping Crane

Diet Calculations." Did you prepare this table?

A Yes, I did.

Q And what does this table show?

A What we needed to do was basically create a Rosetta Stone to be able to translate the percentages of the diets to something that we could interpret in terms not only of energy, metabolizable energy available but also what is the -- we needed to know for the model what's the dry mass, dry weight, what's the wet weight because that will tell us how much pre-water is available when you eat this item.

We also wanted to know the protein, the lipid and the carbohydrate concentration because each of these different diet types have a certain amount of calories associated with them. In general, lipids are about twice as energetic as proteins and carbohydrates and so I also -- since we had the diets from up north as well as down here, that would give us the broadest possible diet composition. So I made sure that everything here represented what had been seen by various people and -- who were observing food consumption by whooping cranes.

Q Let's go to Page 2 of Defendants' Exhibit 212 and, Dr. Porter, just be careful when you're waving the wand --

A Oh, I'm sorry.

Q -- about the microphone.

A Yeah.

THE COURT: I need to figure this out again. When

you decided on the dietary models to use, you picked Hunt and Greer because of the quality of their research? Is that what you're saying?

THE WITNESS: What we wanted were two independent sources of diet that we knew were realistic kinds of diet, however good --

THE COURT: How did you know that they were realistic kind of diets?

THE WITNESS: -- however good they were, they were the -- what we saw from the literature -- what I wanted --

THE COURT: Did Dr. Slack tell you these were the best?

THE WITNESS: No -- I'm sorry?

THE COURT: You said you relied on something about Dr. Slack?

THE WITNESS: Well, we knew about him and we knew about his work because --

THE COURT: How did you know about him and his work?

THE WITNESS: Megan mostly through the crane foundation.

THE COURT: Okay.

THE WITNESS: People at the crane foundation knew the work down there and so -- let's see, where were we? I lost track of my thoughts --

THE COURT: How did you pick those two studies?

THE WITNESS: Oh --

THE COURT: Did your graduate student pick those two?

THE WITNESS: I don't remember. I think it was a collaborative kind of thing. Also Jeb Barzen at the International Crane Foundation suggested these two. We chose them because I wanted temporal resolution because the model that we were going to be using is kind of its minimal resolution. I mean, we can go to any resolution we want but we wanted to do at least monthly simulations and so I wanted diets that were specific by month if I could get them and if they weren't that high resolution, we'd try to make it into a --

THE COURT: So where did Dr. Slack come in for your picking these two models?

THE WITNESS: Actually he didn't come in until much, much later. We picked the diets ahead of time and then we -- I --

THE COURT: How did you pick the two diets?

THE WITNESS: Megan and I looked at the literature. We asked, you know, what is out there just like these --

THE COURT: Who did you ask?

THE WITNESS: We basically simply went to the literature and we talked to Jeb Barzen at the International Crane Foundation and said -- because we said, you know --

THE COURT: Not -- I just want to know did anybody else suggest these two diets -- dietary models to you?

THE WITNESS: No.

THE COURT: Okay.

THE WITNESS: And what we did here was -- these are the sources for that table that we just saw. We looked at Nelson which was the first one. We took some data from Greer. We took data from Chavez-Ramirez, Bell, Karasov -- Bill Karasov is on our faculty -- on our -- in our university, Greenlee (phonetic), Nelson, Jardian (phonetic), Owen, Durenfeld (phonetic), Koria (phonetic), Benish (phonetic), Styling (phonetic), Cantru (phonetic), Anderson and Lowe. These are the people in the literature who had data applicable to the kinds of diet items that we -- at least from what we could tell were being consumed by cranes.

THE COURT: So you didn't use Chavez-Ramirez's dietary model?

THE WITNESS: No, because --

THE COURT: Why?

THE WITNESS: I'm not -- I don't remember exactly why we didn't. I think early on we didn't see his stuff and discovered it later. We could do that one too. It doesn't make any difference because every single diet we ran showed that the birds were very comfortable in terms of their energetics. They're well below what they -- what they're capable of doing in terms of their requirements. I'll show you that in a minute.

THE COURT: Go ahead.

BY MS. ROBB:

Q So, Dr. Porter --

THE COURT: So they've got a lot of energy?

THE WITNESS: There's a lot of energy available.

THE COURT: Okay.

BY MS. ROBB:

Q So, Dr. Porter, you did a literature search and took the Hunt and Greer items that they recorded that the whooping cranes were eating in Aransas, correct?

A That's right. We wanted to translate the percentages into something quantitative.

Q And then you made a -- you did Table 2, the composition of the food items using the food items that you had gotten from the Hunt and Greer articles and studies?

A Yes, that's exactly correct.

Q And this list is a further research that you did to obtain the values that are on Table 2 for the food items?

A That's correct. That's right. These are the sources for those.

Q I notice that, you know, there's been a lot of talk the last few days about Allen. I notice you have no Allen data cited. Why is that?

A Well, these were more recent data. Allen had a very broad listing and actually I didn't know about Allen until quite a

bit later and so this was what we knew early on and so --

THE COURT: How could you not know about these studies that were published?

THE WITNESS: I know, I know. I feel very embarrassed --

THE COURT: I would imagine.

THE WITNESS: -- after having been here and hearing about all of this. It just --

THE COURT: It's just -- it's amazing. I mean, did you talk with Dr. Archibald when you came up with modeling or --

THE WITNESS: No. Actually Dr. Archibald was pretty much always gone and so there was no real opportunity to interact with him.

THE COURT: Okay.

BY MS. ROBB:

Q All right. Let's look at the models of -- from the actual whooping crane diet from Hunt during the winter of '83-'84. Let's look at Defendants' Exhibit 372. Could you discuss what you found in this?

A Yes. This is -- what I'm going to show you here is the comparison between the sexes for two different years assuming a diet that is representative of what Hunt and Slack reported for the dietary items that they reported and the percentages that they reported and here's where -- these are predictions from a

Niche Mapper model of what does the number of items per minute have to be to meet the demands if you have the coldest winter on record versus the warmest winter on record from 1941 through 2008 because when we got this datum when we did these early ones, that was what we had available.

And what we see is that given all the different kinds of foods they're eating and their nutritive and energetic values, these birds -- whether it's the coldest year or the warmest year on record in Aransas, they'd be having to feed at a rate of about .045 items per minute on average for these first two months of October and November. In the month of December because of dietary changes, the foraging rates would have to be on the order of about 0.65 roughly and that drops a little bit off as you go to January and February. That's for -- this is for the female.

Q And let's look at the male, Defendants' Exhibit 374.

A And what you see, the numbers are almost exactly the same. So sex does not make a difference and climate -- temperature does not make any kind of significant difference up here.

Q All right. Let's look at Defendants' Exhibit 380. So you just described Hunt '83-'84. This is a pie chart summarizing the actual whooping crane diet studied by Hunt during the winter of '84-'85. Are you familiar with this data?

A Yes, I am.

Q And this is also based on fecal analysis, correct?

A That's correct.
Q And how did you use Hunt's second year of data in the model?
A Exactly the way we did the first year. We took the percentages here for each of the dietary items and translated that into number of items of each of those different types and then computed the energetic requirements on that basis.
Q Let's look at the results. Let's look at Defendants' Exhibit 373.
A Now, that different dietary system -- before we were looking at numbers down about this range. Because of the change in diet now, the foraging frequency that we would calculate to maintain a neutral energy balance. So they're not making a profit. They're not making a loss. This is just neutral energy balance and here's the coldest year and the warmest year. This is for the female and as you see as we go across the way here, wolfberries in the diet and clams in the diet and snails in the diet and so on.
Q And let's look at the male case, Defendants' Exhibit 375.
A And again you see very, very minimal difference. There's a little bit of difference here in this month in terms of temperature but not much at all and then here are the other months.
Q So now let's turn to the Greer diet. Let's look at Defendants' Exhibit 224 and this is a summary of Greer's

observations of the whooping crane diets in the winters of 2004-5 and 2005-6. Are you familiar with this data?

A Yes, I am.

Q And how did you use Greer's two years of data in your model?

A We used it exactly the way we did with Hunt and Slack's data. The percentages here went into the diet and then we used that Rosetta Stone table to translate it into number of items and energetic content.

Q And let's look at Defendants' Exhibit 218 for the results.

A So what we see -- these are predictions now of the Niche Mapper model. So if they're eating wolfberries exclusively cold and warm here -- and this is for a female to maintain neutral energy balance -- they'd be needing to consume about 1.4 wolfberries per minute to meet a neutral energy balance requirement. When they add other items besides wolfberries, the foraging requirements drop precipitously. With a few clams in the diet in here in December compared to November, the foraging rate drops from 1.4 per minute down to about one and -- 0.15 items per minutes and then when you've got nothing but crabs, the foraging rate goes way, way down.

Q And this is 2004-05 for Greer. Let's look at Defendants' Exhibit 219, 2005-6 for Greer.

A And here --

Q What does that show?

A Right. What we have here is we've got a little bit on top. It's hard to see but there's a little bit of clam in here and that diminishes the requirements. When they go to nearly all wolfberries, it jumps up to about, roughly, 1.3 items per minute so that we would consider these to be the highest kind of foraging rates and that's moderately -- I mean, we can quantify that, however good those quantifications are and then when you bring in other dietary items, the foraging rate drops way, way down again in January, February and March.

Q Let's turn to Defendants' Exhibit 220.

A And I really want to focus on this one right up here because this gives us the actual observations of how much are they consuming. These are data from Greer's thesis and what we see here is that the numbers here are about 17 items per minute for wolfberries. Wolf -- and the Niche Mapper is calculating about one per minute. So there is -- they're foraging at a much higher rate than they would need to -- just to maintain an ordinary energy balance and that happens to be true for any kind of dietary scenario we ran. If we ran a -- so I -- or can I just go ahead and talk about that?

Q Please.

A We ran a series of hypothetical diets, too. We ran all wolfberries. We ran an all-crab diet. We ran half wolfberries and then half snails and half -- I'm sorry -- quarter snails and quarter clam. We ran half blue crabs and then 25 percent

each of snails and clams. These were hypothetical diets to try to get at extremes, all of one diet -- of one species or a small mix of a species. We're trying to bound the whole problem to say, what is the full range of any possible diet that these birds might consume and how does our calculation of foraging-rate requirements -- how does that compare to what's actually observed in terms of how fast -- how many items they're consuming.

Now, Megan, when I asked her, you know -- when you're watching these birds in the wild, how in the heck do you know what they're eating. I mean, you can't get real close to them in the wild like you can at the International Crane Foundation. How do you know what they're eating and she said it's very straightforward? She said -- well, no, she -- I don't think she said straightforward but she said you can tell within a reasonable certainty based upon three criteria. One is where are they in the habitat. Are they in the water? Are they on the shore? Are they in the grass or the marsh because each of those places represents different food available?

THE COURT: Okay. She observed them in the Aransas Wildlife Refuge?

THE WITNESS: Yeah. Yes, she did -- no, not in Aransas --

MS. ROBB: No, no --

THE WITNESS: -- in Wisconsin.

THE COURT: Okay. So she doesn't have any -- any point of reference of how they eat in the Aransas Wildlife Refuge?

THE WITNESS: That's right. That's absolutely correct.

THE COURT: So don't tell me about the marsh and the waters and whatever because you --

THE WITNESS: Oh, I'm sorry. What we were trying to get at was two different independent sources of observation.

THE COURT: Okay. This is not good.

THE WITNESS: That was all I was trying to do.

THE COURT: This is not good.

THE WITNESS: Okay.

THE COURT: Okay. Keep moving.

THE WITNESS: Okay.

BY MS. ROBB:

Q All right. Dr. Porter, this process that you followed of identifying the animal, searching the literature for what the animal eats and the site, gathering the observations and the data to put into the model, identifying the food values for what the animal eats and running the model, is this the same process that you follow whenever you use Niche Mapper?

A Yes, it is. This is the standard process.

Q And in your opinion, what does the study that you did on the whooping cranes with Niche Mapper show about the energy

balance of whooping cranes?
A It shows no matter what diet we choose, whether it be the hypothetical diet or observed diets, whether they be fecal or by direct observation, the birds are always very comfortably in a positive energy balance by a long shot.
Q Dr. Porter, in your opinion, do the results of your modeling show that whooping cranes maintain positive energy balance in a wide variety of food scenarios and climate conditions?
A Yes, they do.
Q And, Dr. Porter --
THE COURT: Why did they ever become extinct almost then if they were all so comfortable?
THE WITNESS: Oh, a lot of human intrusion basically.
THE COURT: Okay. I guess I'm not getting the whole --
THE WITNESS: Yeah. No, they have the capacity to grow. It's just that we have to protect them instead of shooting them for --
THE COURT: Well, apparently we don't have to do anything --
THE WITNESS: -- feathers.
THE COURT: -- because they're all so comfortable in their environment. We don't have to worry about salinity or freshwater flows. Is that what you're saying?

THE WITNESS: No, that's not what I'm saying.

THE COURT: Okay.

THE WITNESS: I'm just saying that based on their energetics and their properties and the environments that they're in, the food requirements are -- and their foraging activity are such that it indicates that they're in a very comfortable energy balance, positive.

THE COURT: Okay. I know this is for me and I'm not getting it. So I'll have to tell you that.

MR. FERNANDES: This would be a good time for our 10:00 o'clock break.

THE COURT: Okay, thank you.

(A recess was taken from 10:02 a.m. to 10:23 a.m.; parties present)

THE CLERK: All rise.

THE COURT: Thank you, you may be seated. Go ahead.

DIRECT EXAMINATION (CONTINUED)

BY MS. ROBB:

Q Dr. Porter, you can sit down. Dr. Porter, we were talking before the break about the model and I just want to make sure that we're clear about what you do and do not do with Niche Mapper. Your narrow purpose with Niche Mapper is to identify the energy balance that comes from food items eaten, correct?

A Yes, that's one of the things that Niche Mapper is for.

Q And you do put climate and temperature and all the inputs

that you discussed before the break into the model because you need those to consider the energy balance calculation?

A That's correct. Yeah.

Q But you're not using Niche Mapper to tell us anything about the suitability of the overall environment or the climate --

THE COURT: I thought he was. I thought he said everything was fine as the bottom line of this.

MS. ROBB: Well --

THE COURT: Everything is fine with the food source for the whooping cranes.

THE WITNESS: Perhaps I could clarify that.

THE COURT: That would be good.

THE WITNESS: Thank you. What I'm wanting to define is how does the environment affect the energy requirements of the bird, the heat energy requirements, the chemical energy requirements and how does that translate into the number of food items that they have to consume per unit time. I don't know if that helps.

THE COURT: Thank you.

BY MS. ROBB:

Q And, Dr. Porter, going back to the scenarios you ran, you said that you ran hypothetical scenarios. Did you do those first?

A Yes. Actually I did the hypothetical ones first because

we hadn't really dug into much of the literature in terms of what the cranes ate other than to determine what the range of things were that they were consuming and they actually started with the foods that they eat up in Wisconsin and then added in the Aransas types of foods and then just did extreme calculations or bounding -- I'm sorry, darn it -- bounding calculations like, for example, exclusive wolfberries, exclusive blue crabs, no blue crabs but all wolfberries and then mixes of wolfberries and/or crabs plus other kinds of common items in their diet just to bound the problem to find out no matter what kind of diet they're consuming, what kind of percentages they're consuming, what are the conclusions that we might draw in terms of their foraging requirements in the environments that they are in and do the calculated rates that would be needed to maintain a neutral energy balance, do -- how do they compare with what was actually observed in terms of the actual food consumption, whether you're -- whether we were observing them in Necedah or whether we -- they were observed by other people down in Aransas.

Q And after you did the hypothetical studies, then you chose the Greer observations on the food --

A Yes.

Q -- or items and why did you choose Greer? What appealed to you about that study?

A The primary thing that appealed to me about the Greer diet

was that it had a lot of temporal resolution and --
Q And what do you mean by that?
A That it changed through -- well, we knew what they were doing for each month of the year. We had very good time resolution on their food consumption types.
Q And why is it important to you to know month?
A Because the model works on an hourly basis for every day of simulation and what we typically will do, but we aren't constrained to that, is we'll do the average day for each month of a particular year, the average day's conditions for air temperature and wind speed and so on so that we get a representation of kind of what's happening through time.
Q And then you went to the Hunt data, in fact, after you had submitted your first expert report, correct?
A Yes, that's correct.
Q And why did you decide to also run the Hunt data?
A Well, I wanted another type of confirmation of what would be at least one kind of diet that the whooping cranes might consume and a fecal analysis says this -- for sure, these items were in the diet. There might have been other things that might not be there but at least these we know were there because they're in the feces and so it was a very different way to look at diet composition and explore whether or not whatever diets might be determined that way and how would they affect the calculated foraging rate requirements to stay in a positive

energy balance or stay in a neutral energy balance.
Q And is this a typical process for you when using Niche Mapper with other animals that you've used it with?
A That's what we do all the time.
Q Dr. Porter, in your opinion, do the results of your modeling work provide any evidence that a reduced abundance of blue crabs or wolfberry would have resulted in a negative balance for whooping cranes?
A There's no evidence in anything I've done that would indicate that.
Q And, Dr. Porter, in your opinion, when the whooping cranes switch to foods other than blue crabs and wolfberries, do they burn up fat reserve and experience a net loss of energy for part of the winter when they're switching?
A None of my calculations indicate that.
Q All right. Let's look at Defendants' Exhibit 214. So, Dr. Porter, let's talk about the drinking water needs and water needs physiologically of whooping cranes. Do whooping cranes drink water?
A Yes, they do.
Q And did you consider their drinking water in the analysis that you did about their water needs?
A No, I wanted to ask the question, the bounding question if you will, if they do not drink any water, what would be their water requirements and are they going to be in a positive or

negative energy balance. So what we have here are several columns of data. The very first left-most column is month of the year. This is November, December, January and so on down to -- through October. The first column here -- these are output from Niche Mapper using the Greer dietary model and we wanted to also look at flight costs.

So we're looking at one flight per day, we're assuming here a thousand-meter round-trip flight and we're assuming that they're going twice as slow. So they're in the air twice as long. So we're -- again, we're trying to get a bounding maximum energetic cost per flight. So the total field metabolic rate that we calculate here in kilojoules per day -- and kilojoule is simply another way to define energy. This could just as well be calories per day. It's just a different unit. A joule is about -- about 4 joules is about 1 calorie and so we're looking at anywhere from 19 to 21 kilojoules per day down to about 2,046 here and then down again here. This is for a cold year.

So again it's -- we're trying to get a limiting condition here. Now, the question is given this requirement for energy, how many grams of food would they need given the Greer diet which we have and so here are the grams of food wet weight for that kind of a diet that they should consume in a day. Now we want to ask, okay, what's the discretionary water. They get a certain amount of free water from their food and

then they're going to have a cost of evaporative water loss. So what we get is the total water that they have and the 409 number is a combination of both the metabolic water that's produced when they oxidize the protein, carbohydrate and fat plus the free water that they get in the food of the particular items in the particular percentages that were recorded.

The calculated water loss from both respiration and cutaneous, or water lost from the skin -- here's the water loss. Here's what they have to spend and so it's really clear that they've got way more water. They could drink if they want to but on these bases of these calculations, they've got way plenty of water and that's true throughout the whole year for these calculations. Well, now we wanted to really push the envelope and say, okay, let's make them fly ten times a day, a thousand meters each flight. We're going to double the normal flight time and what is the field metabolic --

Q Dr. Porter, just --

THE COURT: Please be careful with the microphone.

THE WITNESS: Oh, I'm sorry. Jesus, I'm sorry. I'm sorry, bugger, excuse me. I apologize.

THE COURT: How very British.

THE WITNESS: I'm going to have to move up a little closer so I'm away from the microphone. Can you still hear me all right? Okay.

Okay. So if we go from one flight per day energy

cost to ten flights per day, we're going from 1,921 kilojoules per day to 2,072 kilojoules per day and here are the numbers all the way down through the months. Given that they're going to fly ten flights per day, they're going to need more food and here is the grams of wet weight food they're going to require and then given the kinds of food that they are consuming and the water content of that food and their metabolic water production, we're getting anywhere from 442 to 591 and so on down through the list here.

And then finally the last column is how much must they lose through their respiratory system and their skin and here are the numbers over here. So instead of 28 when they're flying once a day, we're looking at 30 grams loss of water and instead of 409 grams of water available, they've got 442 grams of water available and so what we see in these last two columns here for ten flights per day is again that they have an abundance of water from their food both metabolically and free water and they would not have to drink although they certainly could drink.

BY MS. ROBB:

Q And why did you choose ten flights a day?

A Well, actually Chavez-Ramirez reports that typically they fly twice a day and what we wanted to do was to really push the envelope and say, if flight is really costly in terms of energy or food, let's really push it way out there to what might be

considered an unrealistic number.

Q All right. Let's go to Defendants' Exhibit 213. Did you prepare this table?

A Yes.

Q And can you describe what this table shows?

A In a way, it's saying the same thing but it's a way of sort of quantifying in terms of number of food items, what does it cost to fly. So what we have first in the left column is the type of food. Let's assume that they're eating only this particular type of food in the left column. If they have one flight per day, it would cost them .91 small blue crabs to fuel one flight. If they're flying two flights per day as Chavez-Ramirez suggests, then it would take 1.81 clams -- or crabs -- I'm sorry -- to meet that demand.

THE COURT: How much? Say that again.

THE WITNESS: Yes.

THE COURT: Nine point what?

THE WITNESS: Point -- I'm sorry -- .91, I misspoke and then 1.81 crabs to fuel two flights. In other words, how much gas do you need in the tank to fly?

THE COURT: I got it.

THE WITNESS: And then we go to a medium blue crab which is larger and so we're talking about a third of a blue crab for two flights. We go to a large blue crab. We're talking about a little over a tenth of a crab to fuel that

flight. If we want to do wolfberries, we're looking at 25 wolfberries to fuel two flights.

THE COURT: Did you know that there's -- were you here for the testimony that they eat 70 to 80 crabs a day?

THE WITNESS: I don't remember. Yes, that's possible especially if they're --

THE COURT: So they're overdoing it?

THE WITNESS: Not if they're laying on reserves for migratory flight and they do that in March. They go way up in their food consumption in March.

THE COURT: Based on the Greer study and not --

THE WITNESS: I believe that's -- yes, that -- those data were in Greer in her March data.

THE COURT: Okay, thank you.

THE WITNESS: Insects, we're talking three and a half insects for two flights. For clams, we're talking a half a clam basically for two flights. For snails, if they're eating nothing but snails, we're talking seven-tenths of a snail. For Fiddler crabs, we're talking 3.1 Fiddler crabs for two flights and if we're talking crayfish, .73 part -- or three-quarters of a crayfish. So this was an effort to try to say the same thing in a different way, what is the energy cost a flight.

BY MS. ROBB:

Q Dr. Porter, you agree -- do you agree that flights outside of the marsh increase energetic expenditure for the whooping

cranes?
A Absolutely.
Q And as a result of your studies, what's your opinion about the effect on energetics of the whooping cranes when they fly to the uplands?
A Their energetics go up when they have to fly.
Q Is it your opinion that the whooping cranes maintain a positive energy balance when flying to the uplands?
A Yes.
Q And is it your opinion that flights create undue stress for the whooping cranes?
A No.
Q Is it your opinion that the crane flights to the uplands do not result in increased stress or reduced body condition for the whooping cranes?
A They would not result in elevated stress, yes, and/or induction of stress. That's my conclusion -- my opinion.
Q When you did your modeling results -- analysis, excuse me -- did you use data specific to the diet of the whooping cranes for the year 2008-09?
A No, I did not.
Q And would input of that data have led you to make different conclusions about the energetic balance based on the foods you looked at?
A No, it would not because I've done what I would consider

to be a complete bonding of all possible scenarios of food intake.

MS. ROBB: I pass the witness.

THE COURT: Thank you. I'm sure there's no cross examination. So we'll move on.

MR. BLACKBURN: May I proceed?

THE COURT: Please.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Good morning, Dr. Porter. I'm Jim Blackburn. I don't think we've ever really met before.

A No, nice to meet you, Jim.

Q Nice to meet you. I'll get organized here for one second. What I'd like to do is just start out a little bit just kind of talking about the process. Have you ever been an expert witness before?

A Yes, I have, twice.

Q And I'm curious just about a couple of things. One, you mentioned going to the International Crane Foundation up in Baraboo which I -- at least I got to up there this year. It's somewhat near to Madison, I believe.

A Yes, we're north of there a little bit.

Q And I think you went up there to basically make some measurements about certain aspects of whooping cranes?

A Yes, I went up there actually for two reasons. One was I

had actually, believe it or not, never been there although I had been wanting to go there for years and so it was my first chance to see a whole lot of different kinds of species of cranes and how they took care of them, how they handled them. Actually I was hoping to get a couple of feathers before I was told that was not possible.

Q And when you went there was after you had been retained as an expert in this case; is that right?

A That's correct.

Q And you were -- your Niche Mapper program did not have whooping cranes in it prior to your being retained for this case; is that right?

A The properties of whooping cranes were not available yet, no.

Q And so you went to ICF and asked them to allow access to whooping cranes to provide some of this data for your input?

A That's correct.

Q Did you tell them that you were involved in litigation involving this case?

A We did right up front right at the very beginning because I was concerned that possibly being involved might affect our ability to continue to collaborate with them and so I made very sure that that was way up front and I would not actually have participated in this case if they had turned me down and said they would be concerned about it.

Q Who did you tell this to?
A Jeb Barzen.
Q Jeb?
A Barzen, B-a-r-z-e-n. And I also told it to the veterinarians there.
Q Now, with regard to the whole question of when you came to use the Hunt data, isn't it true that when you submitted your expert report, that was based upon -- the analysis was based upon Greer's data and a hypothetical kind of food distribution?
A That's correct.
Q And at that point in time, you did not include a Hunt diet, correct?
A That's correct.
Q And isn't it also true that you were questioned substantially in your deposition about the Greer diet?
A Yes, that's right.
Q And isn't it also true that -- or let me ask you. Did you see the rebuttal report of Dr. Felipe Chavez-Ramirez where he offered the criticism of the Greer diet?
A I'm pretty sure I did. I'm -- yes, I'm pretty sure I did.
Q Now, subsequent to that deposition and subsequent to Dr. Chavez-Ramirez submitting that information, you modified your expert report to include the Hunt data, correct?
A Yes, I felt that it would be very -- I'm always trying to find what are the bounds or what are the limits or the

constraints on the problem and it was obvious after thinking about it that a fecal analysis of diet content would be helpful in terms of broadening the perspective and the analysis.

Q And you had all the opportunity to consider that before you wrote your expert report but you didn't think of it at that point, right?

A I was in the middle of some really heavy duty teaching my thousand students and I was swamped and so I really simply wanted --

THE COURT: So when you tell me you picked those two diets, you didn't pick those two diets until after you were deposed and criticized? You picked one diet?

THE WITNESS: The initial diet I chose -- well, actually there was --

THE COURT: Is this a "Yes" or a "No"?

THE WITNESS: Okay, um --

THE COURT: You told me earlier that you picked the two diets after an extensive review of the literature where you list all the other diets when, in fact, you only picked one diet until you were deposed and criticized and you added another diet.

THE WITNESS: That's correct.

THE COURT: That's just not -- sound very nice. That's all.

THE WITNESS: I'm sorry.

THE COURT: Go ahead.

BY MR. BLACKBURN:

Q Now --

THE COURT: Is that the way you do your scientific studies?

THE WITNESS: New ideas come to me all the time --

THE COURT: I bet.

THE WITNESS: -- and as they come, I incorporate them and yeah, I apologize. I forgot that.

THE COURT: That's kind of a biggie to overlook.

BY MR. BLACKBURN:

Q Now, you -- in terms of how you came across the Hunt report, is it -- isn't it true that you received an email from someone named Kathy that transmitted the Hunt report to you?

A I'm -- let's see. Let me think. I -- that might be correct. I think I may have asked Counsel for a copy of it because I wanted a copy and they could get it for me quicker than I could dig it out myself.

Q Because you had not previously considered Hunt, had you?

A I -- we had looked in the literature but I -- and -- but I don't think that we had done Hunt. No, I think --

THE COURT: Have you testified as an expert in this kind of an area?

THE WITNESS: No, this is my first time.

THE COURT: Okay.

THE WITNESS: It was just kind of a --

THE COURT: I have -- I just never heard of an academic scientist that did a review of the literature and only used one of the studies out of all the studies.

THE WITNESS: Um --

THE COURT: I find that very surprising.

THE WITNESS: Well, what I did initially I actually was --

THE COURT: You didn't use Dr. Chavez-Ramirez's because you said you didn't find it.

THE WITNESS: There weren't any real month-by-month data in his study as --

THE COURT: You said you didn't even look at it.

THE WITNESS: Initially we didn't because it didn't -- then I looked at it and there was nothing there that we could really use.

THE COURT: I'm not pleased. Go ahead.

BY MR. BLACKBURN:

Q Now, did Counsel suggest that you add additional information -- well, I'm sorry. I bet I can't ask that question.

THE COURT: I actually think you can, I think. I don't think that's attorney-client privilege. Is it?

MR. UNIDENTIFIED: It's not attorney-client.

MR. FERNANDES: Under the new expert rules, it is.

Under the changes in the expert rules, transmittals between Counsel and experts are privileged and that's how I think we've handled it on both sides. Can you get your book?

MR. BLACKBURN: Okay. Your Honor, that was what I was concerned about is this new rule but I've just been notified that to the extent that facts or data -- that the -- if facts or data are provided by the party's attorney -- the expert's attorney, that is a fair question. So --

THE COURT: Okay. Well, I want Mr. Fernandes' agreement on that or Ms. Robb.

MR. BLACKBURN: That would be under --

MR. MUNDY: Rule 26(c) --

MR. BLACKBURN: Two.

MR. MUNDY: -- sub little 2i.

THE COURT: While you're looking this up, is this a study you feel comfortable publishing and having peer-reviewed?

THE WITNESS: Oh, absolutely. We have it written up and everything. We're ready to submit it almost.

MR. FERNANDES: The one thing that's been lost in all this is he said over and over again in his expert report and when you look at the hypotheticals that were run, they were in the range like this which include every single study that's out there including Dr. Chavez-Ramirez's.

THE COURT: But they didn't at the beginning apparently because he didn't know it was there.

MR. FERNANDES: No, his first one, he did list the hypothetical.

THE COURT: So where did you get the notification to use the --

MR. BLACKBURN: The Hunt.

THE COURT: -- the Hunt report?

THE WITNESS: Firstly, I never let somebody tell me what I want to run.

THE COURT: Just where did you get it?

THE WITNESS: I got it from -- I asked for the report from counsel because they could get it for me quicker.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Now --

THE COURT: You couldn't get it in your survey of the literature?

THE WITNESS: Well, we weren't surveying that part of the literature. We were surveying really the literature primarily that dealt with what are the energetic content of the different types of food items.

THE COURT: Well, how did you know that -- I'm sorry. How did you know there was a Hunt report --

THE WITNESS: Um --

THE COURT: -- if you didn't find it in the literature?

THE WITNESS: Well, we were advised that there were --

THE COURT: By the attorney?

THE WITNESS: By the counsel that there were additional --

THE COURT: Okay.

THE WITNESS: -- studies that we could --

THE COURT: I've got it.

THE WITNESS: -- that we could use.

THE COURT: Now you can move on.

BY MR. BLACKBURN:

Q Now, I want to kind of cut to the chase.

THE COURT: Good.

THE WITNESS: That's great, Jim.

MR. BLACKBURN: I'm trying to learn, your Honor.

THE WITNESS: Thank you.

BY MR. BLACKBURN:

Q You have a model. Now, it didn't initially have a whooping crane in it. You went out and got some information from the crane foundation and others about how whooping cranes function, sort of their whole -- the inputs you need for them to respond to what I call environmental stress, the air, the temperature, the different things that you had in your diagram.

A Actually we went to the crane foundation just to get two things, the morphology and some physiological data.

Q But you had to describe the bird so that --
A That's right.
Q -- you could input it to your model?
A That's right.
Q And you came up with a calculation of how much energy that bird would use under normal conditions and normal activities which is some -- I would just say some hypothetical day of foraging or whatever that you would use as a base?
A Well, what we do is firstly reconstruct an accurate climate reconstruction for the particular year for the particular diet that we were going to use. So we wanted to get the climate right first. Then we would use the output from the microclimate model plus the animal properties to drive the animal calculations.
Q And so bottom line is you come up with so many -- is it joules of energy that is required by the bird?
A To maintain its body temperature and to do any other kinds of activity like flight.
Q Okay. So something like 1930, 1940 joules, is that per day?
A Kilojoules per day.
Q Kilojoules per day. And that is sort of -- we'll just call that X. That's what the bird needs?
A That's correct.
Q And then you have these hypothetical diets and one is

Greer. One is something that you made up. One is Hunt and they're sort of like kind of circles up above the bird and we'll call them A, B and C?

A Right.

Q And you run a calculation of whether basically with a percentage distribution of those food stuffs the bird can get enough kilojoules to support it?

A No, that isn't exactly what I'm calculating. What I'm calculating is how many kilojoules of food does the animal need to meet the energy demand that will allow it to maintain its body temperature and to do its other functions in the environment.

Q And then you look at that food distribution chart and you determine if that distribution of food can meet those kilojoules?

A No. I take the distribution and I ask how many items in that given the percentage of the different dietary types are needed to meet its daily energy requirement.

THE COURT: And do you figure out how much energy is expended trying to find that particular food group?

THE WITNESS: Actually I don't even do that. What we do is say given the hourly changes in the climate, how much heat does the animal have to generate and then if they're flying, how much extra energy is involved. We add all that up together and then we use that Rosetta Stone that translates

percent diet into dietary item numbers so that we can count how -- or compute how many items they have to consume per unit time in order --

THE COURT: But you don't figure how much energy it takes to get that food?

THE WITNESS: No.

THE COURT: Okay.

THE WITNESS: No, that's part of the addition of what do you -- what does it take to function in -- outdoors.

THE COURT: Where is that in your variable?

THE WITNESS: Typically an animal walking around based on stable isotope studies is on the order of two to two and a half times resting basal metabolic rate. So we can -- and we can put any multiplier within the normal range that you -- that's in the literature for activity of different levels and so we can make assumptions about different activity levels.

THE COURT: Okay. But you don't have -- other than normal walking around whooping crane, you don't have figured in your model the energy it may take to eat one food source instead of another food source?

THE WITNESS: No, that's all subsumed in the activity multiplier that's part of the model.

THE COURT: But you used a normal bird walking around multiplier.

THE WITNESS: I used multiple bird-type multipliers.

We have -- there's a lot of physiological data done --

THE COURT: So you just have to pick one multiplier?

THE WITNESS: Well, we used about two and a half times for activity above resting.

THE COURT: For just normal walking around two and a half --

THE WITNESS: Yeah, yeah and foraging.

THE COURT: That's what I'm telling you --

THE WITNESS: Yeah, I'm sorry.

THE COURT: -- that's what I'm asking you. If you put that in, you didn't take into account the energy that might be used in foraging for clams versus crabs or snails versus crabs?

THE WITNESS: Not explicitly for a particular prey type, no.

THE COURT: Okay. I'm just saying -- and you didn't take into account the food source that are needed to fly back to their summer grounds?

THE WITNESS: If they were flying, we -- we're --

THE COURT: I'm not talking about the daily flight. I'm talking about all that over and above that you have to stock up to get --

THE WITNESS: That's -- yeah, it's all in there. It's just not --

THE COURT: How is that in there?

THE WITNESS: -- exclusively in there.

THE COURT: Okay.

BY MR. BLACKBURN:

Q And now if I might -- let me -- I would like to ask this. When you change one diet to another -- let's say we're going to one that has more insects, more snails, things like that, just like the judge was asking --

A Uh-huh.

Q -- that's a different feeding pattern than would be the case with -- for example, where crabs are abundant and the cranes are working in a pod, right?

A Yeah, the number of items that you would have to consume to meet your energy demand are different because the energy packages that they're consuming have different energy content.

Q Right. And my question is in your modeling effort that you presented here, did you make any adjustment on those variations in foraging behavior?

A No, because it would be subsumed in the activity multiplier.

Q Okay. Now, did you make any assumption regarding how many misses there would be? I mean, did you just assume from Greer's data that every one of those insects had been actually consumed when she made that analysis?

A No, that wasn't the type of calculation that was done, no.

Q And perhaps most importantly, did you assume the food was

there?
A We -- that was one of the reasons why I wanted to do the fecal analysis and to use the fecal data.
Q But, for example --
A No, we had no -- nothing in the model is there about availability.
Q So nothing --
A The model just asks what does the animal have to have to meet its need and what is the foraging rate that it would have to have to eat that kind of diet and how does that compare with what's been observed in terms of feeding frequency.
Q So basically what you've said is you've taken observed diets and you said if this stuff's out there and that the birds eat this stuff, it'll keep them alive?
A That's right.
Q But you made no assessment about whether, in fact, that stuff was out there at any particular point in time?
A No, I did not.
Q So in a way it's a hypothetical study in the sense that hypothetically this diet works for this bird if these things are available?
Q What it says is here's what the bird has to have. This is what must be in the environment in order for it to meet its demand.
THE COURT: Okay. But you're not -- what he's saying

is that you don't make any evaluation of the environment to see if it's still going to be there next year?

THE WITNESS: No, no.

THE COURT: Okay. Or predict the availability of food?

THE WITNESS: No, not at all.

THE COURT: Or determine what's necessary to have the food source there?

THE WITNESS: That's correct.

THE COURT: So what is this about then? Ms. Robb?

MS. ROBB: Your Honor, Dr. Porter's analysis with Niche Mapper shows that in a wide variety of diets in a wide variety of climates to consider the energy from the food and the heat that the whooping crane has a positive energy balance and the contention has been that if they don't have blue crabs and they don't have wolfberries, then they're going to starve and I think that Dr. --

THE COURT: Well, he's not -- he can't tell me any different because he hasn't done -- he can't map out the energy that it takes to eat one diet instead of another diet. If the wolfberries and the blue crabs go away, how much more activity is it going to take to get these other things? I mean, how many -- how much more foraging for insects does it take than just cracking open a blue crab or swallowing it whole, one of those small blue crabs? That's -- so that's -- it's not

telling me anything is what I'm saying.

MS. ROBB: Your Honor, I think -- but Dr. Porter should confirm this. I think that what he would say is the multiplier factor takes that into account.

THE COURT: But it can't if it's just normal walking around. It doesn't change. He has no clue how they forage, how they eat, where they go except from the Greer movies which I have yet to see. What I saw obviously was the worst of the worst part and I'll watch them all in this lifetime --

THE WITNESS: May I add something?

THE COURT: -- and so that kind of multiplier doesn't make sense to me.

THE WITNESS: Can I --

THE COURT: Sure.

THE WITNESS: -- clarify something? What we can do and what we do do is use -- there's several different -- I mean, animals have been recorded from the field to have activity levels up to ten times higher than resting. This is for some birds and --

THE COURT: But you don't have a clue how much these take to forage. You don't have any scientific data for that.

THE WITNESS: Actually there are field data using stable isotopes that a fellow named --

THE COURT: For the whooping crane?

THE WITNESS: I'm sorry?

THE COURT: For the whooping crane?

THE WITNESS: No, nobody has data for whooping cranes.

THE COURT: Okay. I'm just telling you you can't create a model. You can't create a multiplier based on no information which is what you've done. You have done it on what you figure is a normal walking around bird without determining how much energy it takes to forage for this versus forage for that, all these different things that are just critical, critical to the well-being of the whooping crane. Even I can figure that one out.

THE WITNESS: Well, we've done -- there's data on hummingbirds, for example, that are huge --

THE COURT: I don't want to argue with you.

THE WITNESS: Okay.

BY MR. BLACKBURN:

Q Now, the diet year that you -- or the information from Greer covered a certain year. Are you familiar with what year Greer's data was for?

A As I recall, it's, what, 2005 -- well, 2004-2005 and then 2005-2006.

Q And did you evaluate the diets from both years?

A How do you mean evaluate?

Q In your expert report and in your presentation today, you evaluated the diet from 2005-2006, correct?

A I used the percentages that she reported.
Q And are you aware that it has been reported that six whooping cranes died during 2005-2006?
A I believe that's correct.
Q And so on the long end, your Niche Mapper result says there's more than adequate food supply?
A No, that is not what it says.
Q Okay, there's more than adequate energy from this diet to these cranes --
A No, that's not what it says either. I'm sorry. What Niche Mapper says is what would a whooping crane have to do to meet its energy requirements. It doesn't say what is available in the environment. It says what they would need to collect to make it and so we can bound the problem by saying, okay, let's assume that they're only walking around slowly which might be two times resting and -- or let's say that they're really walking around fast, that might be three to four times resting. That ups the energy requirement and so we can bound the problem. We could say it's a hummingbird and it flies around all the time and so it's running at ten times rest and metabolic rate and when it's doing that, of course, it needs more food and therefore the foraging rate has to be higher.
Q Well, I guess my question is --
A That's how I'm approaching --
Q -- and I guess what -- all I'm saying is if you believe

the data that six cranes died, there was a problem during the winter of 2005-2006 and nothing that you did would have indicated any problem on that diet, correct?

A My model doesn't deal with mortality, per se.

MR. BLACKBURN: Thank you.

No further questions, your Honor.

MS. ROBB: Nothing further, your Honor.

THE COURT: Thank you, sir. You may stand down.

THE WITNESS: I can step down, thank you.

(Witness stepped down)

MR. TAYLOR: Your Honor, before Defendants call their next witness, we have two exhibits we'd like to offer.

THE COURT: Hold up. Okay, thank you.

MR. TAYLOR: Defendants offer Defendants' Exhibit 424 and 425.

MR. WAITES: No objection, your Honor.

THE COURT: Defendants' 424 and 425 are admitted. Where are those? Thank you.

(Defendants' Exhibits Numbers 424 and 425 were received in evidence)

MS. ROBB: Your Honor, Defendants call George Ward.

THE COURT: George Ward?

MS. ROBB: W-a-r-d.

THE COURT: Thank you.

THE CLERK: Would you step forward, please? Would

you raise your right hand?

GEORGE WARD, DEFENDANTS' WITNESS, SWORN

THE CLERK: Would you have a seat, please, and watch your step.

DIRECT EXAMINATION

BY MS. ROBB:

Q Please introduce yourself to the Court.

A My name is George Haskell Ward, Jr.

THE COURT: Are you related to Gene Ward?

THE WITNESS: Not to my knowledge.

THE COURT: I'm sorry. I saw a lawyer in here named Gene Ward. I thought, I wonder if he came to see a relative or something.

MR. TAYLOR: Your Honor, may I give the witness --

THE COURT: Yes, please.

MR. TAYLOR: Thank you.

THE WITNESS: Thank you.

BY MS. ROBB:

Q Let's look at Defendants' Exhibit 272, your CV, Dr. Ward. Is this a true and correct copy of your CV?

A Yes, it is.

Q And what is your educational background?

A I have a bachelor's degree in mathematics and physics, a master's in mathematics and scientific method and a PhD in geophysical fluid dynamics. This is the dynamics of the

atmosphere and the ocean.
Q What's your occupation?
A I'm a research scientist at the University of Texas where I'm the associate director of the Center for Research and Water Resources.
Q And how long have you been employed at the University of Texas at Austin?
A Since 1988. That will be 23 years.
Q And what do you do at the Center for Research and Water Resources?
A Well, I'm a research scientist. This means that I perform various research projects that are under external sponsorship.
Q And what is your primary area of study and research?
A Generally the movement of water on the surface of the earth.
Q What work have you done in this area?
A Well, I've done numerous projects that extend from surface water hydrology to the mechanics of the ocean. My specialty is physical oceanography, particularly that of the coastal zone and notably estuaries in which I've done probably a couple of hundred projects mainly emphasizing the bays and estuaries of the state of Texas. This work has ranged from design and execution of field studies, acquisition analysis of data and the development and application of models.
Q Dr. Ward, would you mind just leaning forward slightly and

speaking closer to the mike.

A I'm kind of fearful --

THE COURT: Don't touch it.

BY MS. ROBB:

Q But don't touch it. Please don't touch it.

A Okay.

Q The suggestion has been made that sometimes leaning on the -- by there --

THE COURT: With your right arm leaning forward, you can -- it will bring you right up to the microphone.

THE WITNESS: Okay. How's this?

THE COURT: Much better, thank you, sir.

BY MS. ROBB:

Q So you were saying that you've done work in coastal oceanography and estuaries?

A Yes.

Q And have you done any specific work in San Antonio Bay?

A I've worked in San Antonio Bay off and on over the past 30 years.

Q Have you studied the tides in San Antonio Bay?

A Yes.

Q Have you studied salinity in San Antonio Bay?

A Oh, yes, salinity pervades any study of an estuary.

Q Do you teach courses at the university?

A Well, I'm not a member of the teaching faculty but I have

taught courses on kind of an as-needed basis. I have -- for many years I presented a graduate class in physical oceanography in the Department of Marine Science. More recently I took over the undergraduate general oceanography course in marine science and taught that until about, well, I think 2006 or 2007. I've also given courses on atmospheric dynamics, synoptic meteorology in the College of Engineering.

Q Have you received any honors or awards in your professional capacity?

A A couple. I was inducted into the Golden Key Honor Society a few years ago as an honorary member. This was something the students did and I received the College of Natural Science Teaching Award.

THE COURT: When you say that your work relies on external funding, what kind of funding do you get?

THE WITNESS: I've had my projects funded from federal, state and local and regional agencies. The federal agencies include National Science Foundation, EPA, National Ocean Service which is part of the National Oceanic and Atmospheric Administration, Sea Grant, Corps of Engineers, Bureau of Reclamation, U.S. Geological Survey. I'm sure I'm forgetting some.

THE COURT: Do you get funding from the -- any of the agencies here today?

THE WITNESS: Yes, I do. I've worked for a number of

the river authorities and water management districts in Texas including Guadalupe-Blanco River Authority and San Antonio River Authority.

THE COURT: Okay, thank you.

BY MS. ROBB:

Q And how many technical reports and papers have you authored or co-authored?

A I don't know exactly, over 400.

Q And about how many of those would you estimate are peer-reviewed?

A I don't organize them that way but I would say 30 to 50. I might add that as a research scientist, I'm -- I don't have the same publisher perish demand that is placed upon regular faculty. My demand is get funded or perish.

Q Let's go to Page 17 of your CV. I see that early on you were already writing about estuarine modeling for EPA. Can you tell us about the 1971 article, "Estuary Modeling and Assessment"?

A Yes. This was in the third quarter of the last century. This was a report that was done for EPA that -- whose purpose was to appraise the status, strengths and limitations of the -- what was then the new method of estuary modeling. This report ran to about 600 pages in small font. It proved to be pretty successful for EPA. It was widely used, actually employed as a textbook at Stanford, MIT and at UT.

Q Let's go to Page 18. You have *Ward 1980 Hydrography and the Circulation Processes of Gulf Estuaries*.
A Well, that was a general survey of the estuaries of the Gulf of Mexico, those in Texas, Louisiana, Florida.
Q Let's go to Page 19 of your CV and you have *Ward 1991, An Analysis of Salinity Structure and Stability for Texas Estuaries*. Tell us about that.
A That was one of several reports that were done for the National Ocean Service as a part of its Estuarine Atlas project. The over overall objective was to study and characterize the features of North American estuaries. This particular document was a portion of that that addressed the Texas estuaries. Of course, this included San Antonio Bay.
Q Let's go to Page 21, Ward 1996 also entitled *Estuaries*.
A Yes. This is one that got out of hand. This was published as part of the McGraw-Hill *Handbook for Water Resources*. It ran into a hundred and fifteen pages. It surveyed the entirety of estuarine -- of the estuarine system for estuaries worldwide. We looked at hydrology, circulation processes and the chemistry budget and the ecosystem.
Q Let's go to Page 23, *Ward 2002, Experimental River Diversion from Marsh Enhancement* and I see that one of your co-authors is P.A. Montagna --
A Yes.
Q -- on this article. Tell us about that article.

A This was one of the -- several papers that came out of the so-called Bureau of Reclamation demonstration project in which a real-world scaled experiment was conducted to divert water from the Nueces River into Nueces marsh. This project went on for five or six years and included rigorous field studies of the response of the marsh to this influx of fresh water. I notice also on this page that there are a number of reports on shrimp farming in the estuaries of Honduras and I -- you had asked about honors earlier. I failed to mention that I -- one of the honors that I was very proud to receive was from the shrimp fishermen in Honduras. I worked with them for five or six years on problems of pollution of their estuaries down there and the management of the systems. It was very gratifying.

Q And who -- did you get a grant to do that work?

A In Honduras?

Q Yes.

A I was there under the auspices of the State Department, USAID, and then I went back in 2000 -- oh, 2001 after Hurricane Mitch as part of the U.S. recovery project in Honduras. That devastated the shrimp farms -- not the project, the hurricane.

Q I'm glad to hear that. Let's go to Page 24 of your CV. You've got *Ward 2004, Texas Water at the Century's Turn, Perspectives, Reflections and a Comfort Bag*. That article was for EPA, your CV says.

A That was actually for --
Q Actually that's not true.
A That was for Texas A&M actually.
Q Texas A&M.
A That was -- grew out of a plenary lecture that surveyed the twentieth century and the development of water in Texas. It attempted to span the whole gamut from ground water to surface water and estuaries. I had a brief section in that paper that addressed environmental flow considerations and how they were incorporated into water management late in the century.
Q And just down below is also highlighted a 2011 article, a very recent article. I see again Dr. Montagna is on this article with you, *The Importance of Freshwater Inflows to Texas Estuaries.* What's that about?
A We attempted in this article to explain despite the title, despite the fact that freshwater inflows are of central importance to Texas estuaries why it is so difficult to quantify exactly how the estuaries depend upon inflow and therefore to quantify the needs of the estuary. This was published by Resources for the Future, as you can see.
Q As part of your reporting and writing, have you worked on modeling?
A Yes.
Q And could you tell us a little bit about the modeling work

that you've done?

A Well, I have concentrated mainly on the modeling of transport and water quality in estuaries. This has included the development of --

THE COURT: I'm sorry, on the -- you said transport?

THE WITNESS: Yes -- yes, your Honor.

THE COURT: Thank you.

THE WITNESS: This includes circulation, the forces that create circulation in an estuary. I've developed models for lagoonal estuaries characteristic of the Texas bays. In fact -- this is really turning back the clock but I developed the first salinity model for a Texas estuary back in 1968. I've also developed hydrodynamic models and transport models for the deltaic marsh regions of estuaries. The state has a model delta of which I was the principal author and that has been applied to several deltaic systems including the delta in the San Antonio Bay.

BY MS. ROBB:

Q Is that -- that's -- that model is called the "Delta"?

A Its name is "Delta" --

Q Yeah.

A -- kind of original.

Q And is that model still in use?

A As far as I know.

Q Let's go to Page 30. I see you have a report you did in

1991 on Galveston -- for the Galveston Bay National Estuary program. It's highlighted here. What is the Galveston Bay National Estuary Program?

A Well, the national estuary program in general is a program that is sponsored and administered by the Environmental Protection Agency that has the objective of performing comprehensive studies of major estuaries in the United States, particularly those that are challenged with management problems. We have had two national estuary programs in the state of Texas, one for Galveston Bay of which these two reports were products. The other was in Corpus Christi Bay or more accurately, the Corpus Christi Bay system which extended from Aransas Copano all the way down to Baffin Bay and the upper Laguna Madre. I was the principal investigator for eight or nine projects within these two national estuary programs in Texas and these are reports from a couple of them.

THE COURT: Are you going to -- is he the one that's going to tell me about Nueces Bay?

MS. ROBB: No, that is --

THE COURT: Okay.

MS. ROBB: -- Mr. Vaugh, our --

THE COURT: Got it.

MS. ROBB: -- next witness, your Honor.

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BY MS. ROBB:

Q Let's go to Page 36 --

MS. ROBB: Although Dr. Ward can speak to Nueces Bay at -- within his area of expertise as well.

BY MS. ROBB:

Q These are -- these two last listed are the most recent reports as you've divided your papers up. Are these related to estuary issues?

A Well, these are related directly to San Antonio Bay. The first one on Cedar Bayou, as the title suggests, was an assembly and analysis of the evolution of Cedar Bayou, particularly during the last 150 years or so. This is the inlet that separates Matagorda Island and San Jose Island. It enters Mesquite Bay and is the closest natural inlet to San Antonio Bay. It's been notoriously shoaling for the past 50 years despite many efforts to keep it open.

The second report was a study of the historical record of inflows to San Antonio Bay, the sources of inflow, the relative magnitudes, general behavior of these inflows as evidenced by the data. One of the conclusions from this report was the observation that the inflows in the San Antonio Bay have almost doubled in the period of record since 1940.

Q Are you involved in the Senate Bill 3 process?

A I am. I'm a member of the Science Advisory Committee.

Q And what is the Science Advisory Committee?

A That is a committee of scientists and engineers established by the law and intending to represent a cross-section of experience and knowledge about water management in the state.

Q And how did you attain this position?

A I was appointed by the Environmental Flows Advisory Group. I also served on the earlier incarnations of the Science Advisory Committee in 2004 and 2006.

Q Does the Science Advisory Committee work on a particular bay?

A No, no. We provide guidance and advice to the basin and bay expert science teams, the so-called BBEST, whose responsibilities are to do scientific evaluations of the rivers, streams and estuaries within a given basin.

Q And how many members are on the Science Advisory Committee?

A There are nine of us.

Q Do you have any other particular duties regarding the Guadalupe and San Antonio Bay from the Science Advisory Committee?

A Well, all of my duties -- all of us have the same duties but I did serve as the liaison for the Science Advisory Committee to the Guadalupe-San Antonio BBEST and in that capacity, I participated in all of the meetings and tried to advise when needed.

MS. ROBB: Your Honor, Defendants offer Dr. Ward as an expert on circulation, salinity, distribution, hydrology and modeling.

MR. BLACKBURN: No objection. And none of that was biological, right? I just wanted to make sure about the offer.

MS. ROBB: His opinions will be limited to his expert report, Mr. Blackburn.

MR. BLACKBURN: That's what -- that was my question.

THE COURT: Then he's accepted for that.

BY MS. ROBB:

Q Let's talk about estuaries, Dr. Ward. What is an estuary?

A An estuary is a -- first of all, it's a coastal water course and it is influenced by terrestrial processes and it is influenced by marine processes. This means that it is really transitional between the fresh water or terrestrial environment and the oceanic or marine environment. Among the terrestrial processes that affect an estuary, first and foremost is runoff derived from the land surface that enters the estuary usually organized as river inflows. Other terrestrial influences include transfers of sediment and nutrients that are derived from the land surface.

From the marine side, probably the most notable effect is that of tides. That's what everyone seems to think of when they think about oceanic influences but there are others, waves, the wave climate if the ocean migrates into the

estuary and plays an important physical role and then there are some processes that are peculiar to the coastal zone that arise out of the fact. At least two zones, the terrestrial and the marine are in juxtaposition. These include land sea breeze circulation, littoral transport of sediments along the beachfront --

THE COURT: Wait a minute.

THE WITNESS: Yes, your Honor?

THE COURT: Go ahead and start over with the land sea breeze.

THE WITNESS: The land sea breeze circulation, littoral transports -- that's l-i-t-t-o-r-a-l -- the primary supply of sediment along the beachfront and especially in estuary density currents which arise because the densities of fresh water and sea water are very different and this gives rise to some very peculiar circulations.

BY MS. ROBB:

Q Let's look at Defendants' Exhibit 280. Did you prepare this figure, Dr. Ward?

A Yes, this is one of mine.

Q And what does it show?

A Well, this is probably about as simple an estuary as one might hope to encounter. This shows the estuary of a single river flowing into contact with the ocean and as I commented, estuaries are transitional. Probably the single best indicator

of this is salinity. Salinity means the concentration of salts and water. The ocean is, for practical purposes, a reservoir of nearly constant salinity about 35 parts per thousand. Fresh water is virtually zero.

So in an estuary, we see the intermixing of these two waters of differing salinities and there is established a zone of change or gradient in salinity resulting from this mixing and that is what is depicted in this figure. As river flow increases, this salinity gradient zone will be displaced down the estuary and in some cases out into the adjacent coastal zone. As river flow diminishes, the salinity gradient becomes compressed and retreats back up the estuary to the mouth of the river.

Q Let’s look at Defendants' Exhibit 281 and what does that show?

A Well, this shows how complicated a real estuary can become. The four bays that you see depicted here can be conceived to be a single estuary system because they are interconnected and intermixed. They -- this large, super estuary receives fresh water inflow from the land surface through a number of inflow points that are indicated. The exchange with the ocean, which is a key parameter of estuary dynamics, for these systems occur through two major inlet systems, one Pass Cavallo in the Matagorda system -- and when I say “Pass Cavallo,” I include the artificial entrance channel

-- and through Aransas Pass in the Aransas Copano system.

These are a morphological type of estuary that we refer to as "lagoonal." Most of the Texas estuaries are lagoons. These are characterized by large surface area-to-volume ratios. That is, they have a relatively shallow depth and they have a limited connection to the sea separated from the sea mainly by a barrier island that you see here. The estuary that we are primarily concerned with today is the San Antonio Bay system which is enclosed in that rectangular box.

Q Dr. Ward, do you have a pointer up there and would you like to use it?

THE COURT: Check with Mr. Fernandes.

MS. ROBB: There you go.

THE WITNESS: Yes.

BY MS. ROBB:

Q Okay. So do you just want to point out Pasa Cavallo?

A Pass Cavallo right there -- well, Pasa is the Spanish and the entrance channel is right here. Aransas Pass is located here and this of course is the barrier island complex.

Q Thank you. Let's look at Defendants' Exhibit 282. This shows San Antonio Bay in more detail, doesn't it?

A Yes.

Q Tell us about San Antonio Bay.

Q Well, San Antonio Bay is a lagoonal estuary like many of

the estuaries based on the Texas coast. It has some interesting attributes that sort of set it apart, I think. One of these and probably one of the most immediate is that almost entirely all of its freshwater inflow enters at the head of the estuary just north out of -- above the edge of this map, the two rivers, San Antonio and the Guadalupe conflux into a single channel and they enter the system here at the very upper reach of San Antonio Bay. Now, that's a very handy thing.

If you look at the other estuaries on the Texas coast, Matagorda Bay, Galveston Bay, Corpus Christi Bay, for example, there are multiple inputs of freshwater inflow at various points around the estuary and that makes it complicated to try to sort out the influence of inflow on things in the estuary. In San Antonio Bay, we have a real advantage in that almost entirely the full freshwater input occurs right here at the head of the estuary. Another attribute is that this estuary does not have a free connection to the sea. There is no direct inlet through the barrier island. So its exchange with the sea occurs indirectly through Pass Cavallo in the Matagorda system up the coast and through Aransas Pass down in the Aransas Copano system down the coast and that's very important from the standpoint of the dynamics of this system.

As a kind of a corollary to this, that is, the corollary to the lack of an inlet, there is also no deep-draft ship channel transecting the bay. That's unusual. If we think

of our more developed bays on the coast, Sabine Lake, Galveston Bay, Matagorda Bay, Corpus Christ Bay, even the lower Laguna, all of these have deep-draft ship channels which are a major feature in their circulation and their dynamics. This one does not. In many respects, this estuary is the most pristine on the Texas coast because of this lack of human modification and the lack of peripheral development. I might also point out this little red spot down here in the lower part of the figure. This is a -- the location of a sonde station. A sonde is an automatic or a robot beta collection instrument that automatically senses certain variables --

THE COURT: Can you spell it?

THE WITNESS: Sonde? S-o-n-d-e. And it automatically senses parameters like salinity, temperature and dissolved oxygen. It logs their value and then every so often, this data is downloaded or transmitted to a central receiving station.

THE COURT: Who owns that?

THE WITNESS: This is operated by Texas A&M University at Corpus Christi through the TICUM (phonetic) program and it was paid for by Guadalupe-Blanco River Authority. I think they originally funded this station, I'm going to guess, in 2002. I would have to look it up. It's been there for some years and it's also equipped with some extra instrumentation that people like me get very excited

about. There's current meters and a turbidimeter and we actually have a wave gauge on this instrument, too. I'm going to --

THE COURT: Who picked the location?

THE WITNESS: You know, I'm not sure. I was involved in that selection and made some recommendations but I don't honestly remember why this particular location was selected.

THE COURT: What was your recommendation?

THE WITNESS: My recommendation was somewhere in the lower San Antonio Bay above the GIWW. That's kind of the heart the system --

THE COURT: What's the "GIWW"?

THE WITNESS: Oh, the Gulf Intracoastal Waterway.

THE COURT: Oh, okay.

THE WITNESS: This is this little light line that transects the lower part of the bay.

THE COURT: So somewhere in the middle?

THE WITNESS: Somewhere in this area was my recommendation. Dynamically -- and I'd love to get into this if we had time -- the trajectory of freshwater inflow in the system hugs the right descending shoreline and passes around this way around --

THE COURT: If you're looking out from the bay?

THE WITNESS: Yes. If you're looking the direction of movement, that's kind of the convention of hydrologists. So

if we're looking downstream, it tries to hug the right shoreline and passed down this way into the adjacent bays to the south.

THE COURT: So the water -- the freshwater flow?

THE WITNESS: Yes. That's one advantage to putting this instrument here.

BY MS. ROBB:

Q It's what, Dr. Ward?

A Putting it in that trajectory.

THE COURT: What would be the -- tell me the advantage.

THE WITNESS: By putting it in the trajectory with this freshwater inflow, it would be more sensitive to changes -- responses to changes in freshwater inflow.

THE COURT: I understand, thank you.

BY MS. ROBB:

Q Dr. Ward, did you want to say anything more on this map?

A Um --

Q I'm just going to --

A -- I probably do but I can't think of anything at the moment to add. It'll come to me in five minutes and then I'll blurt it out.

THE COURT: Well, write it down if it comes to you and we'll go back.

THE WITNESS: Okay.

MS. ROBB: That's right.

THE COURT: Do you have something to write with?

THE WITNESS: I do.

THE COURT: Okay.

BY MS. ROBB:

Q Let's look at Defendants' Exhibit 284. Did you prepare this figure?

A Yes, I did.

Q And can you please tell us what it shows?

A Well, I would like to ask you to ignore the little orange dots for a moment. We will get to those shortly and simply look at the blue trace which you can see follows across. It's very difficult to control this little guy. This is a plot --

THE COURT: You can -- you know, you can use your finger if you'd rather mark on there --

THE WITNESS: Okay.

THE COURT: -- and then you tell me when you want to take the marks off and I'll take them off.

THE WITNESS: Oh, okay.

THE COURT: Okay? The tip of your finger.

THE WITNESS: Um, like --

THE COURT: See?

THE WITNESS: -- ah, wonderful. Thank you.

THE COURT: It's a miracle.

THE WITNESS: It is. It reminds me of a blackboard.

THE COURT: I know.

THE WITNESS: This is a graph of two years of inflow to San Antonio Bay and I've chosen these two years because they happen to exhibit some typical properties of freshwater inflow. We could succinctly describe inflow to San Antonio Bay as saying that it is a steady, low flow upon which are superposed flood pulses deriving from the land surface and you can see that in this graph. Right here where I have marked at the beginning, you can see a low flow and then a sequence of flood pulses, another period of low flow here, August-September of 2004 followed by a few pulses and one gigantic frog-strangler which peaked out at about a hundred and -- it looks like a hundred and fifteen, sixteen thousand cubic feet per second.

BY MS. ROBB:

Q Dr. Ward, what did you call that?

A I'm sorry. That's not a technical term. I called it a "frog strangler."

Q A frog strangler?

A Yes.

Q Okay.

A I'm sorry.

Q I've not heard that before.

THE COURT: Just call it a lot of water.

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BY MS. ROBB:

Q A lot of water.

A A lot of water. And then --

THE COURT: Does that result from rain or --

THE WITNESS: Yes, yes, from rain falling on the watershed.

THE COURT: So that was November of '04?

THE WITNESS: Yes, your Honor. The point being that rainfall on a San Antonio Bay watershed is derived from thunderstorms and tends to come in concentrated short bursts that are sparse in time. This creates a kind of flow pattern that hydrologists refer to as "flashy" which is precisely what we see here, low flow with these large excursions of flood flows and then receding back to a low flow again and that is characteristic of San Antonio Bay. The flood pulses, they'll have a pattern. They tend to cluster in seasons, typically the fall and the spring. They vary in magnitude from year to year due to the larger control of atmospheric processes.

BY MS. ROBB:

Q So you say the inflows vary from year to year. Does that include drought?

A Yes, an absence of these inflow pulses, of these flood pulses is symptomatic of drought conditions.

Q And it's not on the data on Figure 5 that we're looking at here but was 2008-09 a drought in your view?

A Yes.
Q Let's look at Defendants' Exhibit 273. What does this table tell us, Dr. Ward?
A Well, this goes to the question you just raised of whether 08-'09 was a drought. One can take the monthly flows from the period of record and order these, say, in ascending order from the lowest to the highest flows and I've done precisely that. This table displays the lowest 5 percent of those monthly flows into San Antonio Bay.

THE COURT: I'm sorry. The exhibit number of this?

MS. ROBB: Oh, I'm sorry, your Honor. It is Defendants' Exhibit 273.

THE COURT: Thank you.

THE WITNESS: This shows the -- as I was just saying -- the lowest 5 percent of monthly flows and you see the year and the month of each one of these flows. I have put in bold those that occur in the 2008-2009 period and indeed in these months, these were rather low flows for San Antonio Bay, I mean, in the lowest 5 percent of all flows since 19 -- approximately 1942. They weren't the lowest that have been experienced in San Antonio Bay. The flows experienced during the notorious drought of the 1950s and the drought of the 1960s were lower but nonetheless we do have three members from that 2008-2009 drought period showing up in this lowest 5 percent. There were -- there are none from 2008 here and of course these

are -- these flows were achieved in summer of 2009.

BY MS. ROBB:

Q And this --

THE COURT: How come there aren't any for the winter?

THE WITNESS: There were none in the winter that showed up in this period.

THE COURT: You mean, so it was a flat pulse?

THE WITNESS: No, the flows during the winter period of 2008-2009 were not low enough to appear in the lowest 5 percent.

THE COURT: Okay, now I got it. Sorry.

BY MS. ROBB:

Q How -- this is -- you've bolded the three months of 2009 so we could look at them --

A Just to point them out that they are here.

Q Right. And that's out of how many data points?

A Oh, well, we've got approximately 70 years. So this is out of more 700, 800 data points. Well --

THE COURT: So this is June, July and August?

THE WITNESS: Yes, yes, your Honor. Not in that order.

BY MS. ROBB:

Q Do you agree with Mr. Trungale that 2008-09 was a drought?

A Yes, I certainly do.

Q Do you agree with Mr. Trungale's definition of drought?

A No, I do not. He used a rather peculiar reference standard for his definition.
Q And what do you mean by that?
A Well, droughts are defined in all kinds of ways depending upon the purposes of the investigator. They're defined in terms of rainfall, soil moisture, river flow as in the case here, contents of reservoirs, levels of aquifers and even economics but all of his definitions have something in common and that is that they specify a standard that is used as a reference to determine -- to define the drought when the parameter of interest falls below that standard or reference, then it is declared a drought and the standard of reference that Mr. Trungale chose to use was the FINS Pattern of Monthly Flows to San Antonio Bay.
Q Let's look at Defendants' Exhibit 274 and, Dr. Ward, what does this figure show?
A That's it. That's the FINS Pattern of Monthly Flows for San Antonio Bay. This is a plot of monthly flows from January through December that was determined by a rather complicated analysis model of the Texas Water Development Board to be what is needed for San Antonio Bay and whereby need, I mean that precisely each level of monthly flow is required, no more, no less and this was the standard that Mr. Trungale used for his drought definition so that if a monthly flow, in his definition, fell below the corresponding monthly value of this

pattern, then it was declared to be a drought month.

Well, you can see some of these are pretty high flows. Look at May and June. May looks like 200 and, oh, 30,000-acre feet per month. That's a substantial flow. June is high also, a hundred and sixty thousand or thereabouts acre feet per month. Well, you can look at the record and see that there are many, many Mays and Junes with flows -- with substantial flows that happen to be less than these values and therefore in Mr. Trungale's determination, those are declared to be drought months. I don't believe that to be realistic.

Q Did the Texas Parks & Wildlife use these monthly flow numbers from FINS to define drought?

A To define drought? No, they did not.

Q Have you seen any drought analysis that defines drought in terms of the FINS analysis that Mr. Trungale used?

A No.

Q Dr. Ward, in your opinion, does Mr. Trungale's use of FINS to define drought result in an unrealistic conclusion about the duration and severity of drought?

A I think it will. I think it corrupts his determination of when droughts do and do not occur and especially their durations.

MS. ROBB: Your Honor, I'm at a natural breakpoint in my questions. Would you like to break for lunch now?

THE COURT: That sounds good. Can I ask him a

question a little bit?

And you will tell me at some time after the break what your analysis of the drought of '08 to '09 was compared to Mr. Trungale's?

THE WITNESS: I wasn't prepared to do that.

THE COURT: Well, I mean, if you both agree it's a drought, then -- never mind. I'll think about it.

MS. ROBB: Well, would you like to hear from Dr. Ward on that issue?

THE COURT: Well, if he's the one that can tell me about it, thank you.

We'll break -- 1:30?

MR. MUNDY: You have some --

THE COURT: Oh, you want to substitute in the book for the book?

MR. UNIDENTIFIED: The long awaited book.

MR. FERNANDES: We object.

THE COURT: Have you marked it?

MR. MUNDY: Pardon?

THE COURT: Have you marked it?

MR. MUNDY: Oh, yes, your Honor.

THE COURT: Thank you.

MR. MUNDY: I showed it to them. It's a perfectly clean -- as new as they come these days.

THE COURT: Good.

(A recess was taken from 11:51 a.m. to 1:39 p.m.; parties present)

THE COURT: Are you-all ready?

MS. SNAPKA: We're ready, your Honor.

THE COURT: Is it just you?

MS. SNAPKA: Does that mean I win?

THE COURT: You win.

MS. SNAPKA: Oh, well, thank you.

THE COURT: It's over.

(Court conferred on other matter from 1:40 p.m. to 1:44 p.m.; resume)

MS. ROBB: Your Honor?

THE COURT: Please.

DIRECT EXAMINATION (CONTINUED)

BY MS. ROBB:

Q Dr. Ward, we were talking about inflows and drought before the lunch break and now we're going to talk a little bit about salinity. Salinity is another important factor to an estuary, isn't it?

A Yes. You could say salinity if the quintessential estuarine parameter. It's measured by a number of methods. So we usually have good data but more importantly, it's a virtually conservative parameter. That means as it moves around, it doesn't gain or lose mass and it's a direct measure of the relative proportion of fresh water and ocean water.

Q How does salinity work in San Antonio Bay?
A Well, earlier --
THE COURT: Didn't you tell me with -- can you tell me with the graph, the exhibit that shows the salinity?
MS. ROBB: Sure. Let's pull up --
THE COURT: I mean, isn't that what he explained already?
MS. ROBB: Right -- Defendants' Exhibit 285.
THE COURT: More salinity towards the mouth, closer to the ocean, higher salinity?
THE WITNESS: That's exactly right --
THE COURT: That's how it works?
THE WITNESS: -- and it does respond to freshwater inflow.
BY MS. ROBB:
Q Okay. You didn't mean this one.
A No, I didn't mean this one.
Q You meant the DX272.
MS. ROBB: Oh, I'm sorry, the next one.
MR. UNIDENTIFIED: Two seventy-four.
MS. ROBB: Two seventy-four --
MR. UNIDENTIFIED: Not that one. The next one.
MS. ROBB: **--** no, 280 -- 280 is the one, I think. Is that the one?
THE WITNESS: No.

MS. ROBB: You want the map, the next one.

THE COURT: That's the one I was talking about. I think that's how it works.

MS. ROBB: Okay, that's what I thought.

THE WITNESS: That one -- that was for the simple estuary.

BY MS. ROBB:

Q Uh-huh.

A Let's go to the next one to San Antonio Bay.

Q The blowup of San Antonio Bay?

A Yes, I think we actually --

Q The next one.

A Good. You may remember that this morning I was describing some attributes of San Antonio Bay that kind of --

THE COURT: I wrote -- every word I put down.

THE WITNESS: Okay. So I don't need to go over that.

THE COURT: Huh-uh.

THE WITNESS: Okay, very good. Well, one thing that those attributes entailed for salinity in San Antonio Bay is that it's a very sluggish responder. Normal estuary has a free connection with the sea which means that salinity can exchange rather quickly. San Antonio Bay is sluggish because its exchange with the sea has to take place far up and down the coast, not directly at its -- at what would normally be an entrance. This means that when a freshwater pulse enters

San Antonio Bay, it does -- it displaces water. The bigger the pulse, the more it displaces. That means it replaces that water that had been there in San Antonio Bay with fresh water and then if the flood pulse is big enough, it can push fresh water all the way out into the sound area that we're looking at here and sometimes even out into the adjacent Gulf of Mexico.

Then salinity works its way back into the system by a combination of processes, a tidal exchange -- and we're going to talk about tides a little bit more in a minute -- by internal circulations, by the density currents that I mentioned earlier, by turbulence. These processes take time and especially in San Antonio Bay because the accesses to the sea are so far removed. So salinity works its way back in by this combination of processes that we refer to collectively as "salinity intrusion." This takes time and as a consequence when San Antonio Bay is freshened, it tends to stay fresher for a longer period of time than would be the case for another estuary.

On the other hand, when it goes into a drought regime, when the inflows drop to very low levels, then it acts more like a big evaporation basin and we see salinities climbing frequently to the 25- and 30-part-per-thousand levels and occasionally even exceeding the salinity of sea water.

BY MS. ROBB:

Q Dr. Ward, before we leave this slide, I wanted to ask you

a question. You had mentioned the GBRA 1 sonde there.
A Yes.
Q Are there others in the area that are not on this map?
A There are some occasional sondes that have been deployed historically by the Texas Water Development Board and I think there are a couple now that are being maintained by Texas Parks & Wildlife.
Q And where -- do you know where they're located?
A Offhand I do not. I could gesture and say in the upper reaches of the bay but I couldn't point exactly to where they are.
Q All right, thank you. Let's pull up Defendants' Exhibit 284 and this is the figure that you asked us to ignore the orange in. Do you want to talk about the orange now?
A Thank you. Yes, now is time to look at the orange circles. These are daily salinity values subsampled from the record at GBRA 1 and I should comment on why I did that. The GBRA 1 is a robot, as I said. It takes salinity measurements very intensely in time -- I believe every five minutes. Had I plotted every one of those, this graph would be covered with orange dots. So I've sampled one a day to kind of give a general impression of how salinity responds to inflow and we talked earlier about flood pulses. You can see -- I'm going to try to make a mark here.
THE COURT: The big November of '04.

THE WITNESS: Well, I wanted to start here in March of '04 --

THE COURT: Okay.

THE WITNESS: -- when the salinities, as you can see -- or the salinity graph is over here. Salinities are relatively high in the 20s but with the occurrence of these pulses in April, May and June, salinities immediately began to drop down to levels of almost zero. You can read over here one or two parts per thousand at this sonde. When the pulses finally diminish, there is a slow rise in salinity here, finally up to about, oh, 12 parts per thousand, not huge at all when the next set of pulses occur. This -- what we referred to this morning as a "frog stranger" dries the salinities entirely to zero for this month of December and part of January and now over the next, oh, I'm going to say year as these flows diminish, we see that there is a slow rise in salinity. The salinity intrusion processes are working but it's taking time to work ocean salinity into San Antonio Bay. Finally at the end of this display period, they have acquired values of, again, between 20 and 25, something like they were at the beginning.

One other point to be made looking at this data is that even in this region past June of 2005 when the inflows are now very, very low -- despite these low inflows, there is still a lot of variation in the salinity about this general increase

in trend. Now, these variations are not due to fluctuations of inflow. The inflows are too low to accomplish anything like that. These are responding to other factors that affect circulation and transport in the estuarine environment.

BY MS. ROBB:

Q Let's look at Defendants' Exhibit 285. What does this show?

A This shows exactly the same data except plotted in a different way. Before we were looking at the time series plot so we could see the history of flow and the history of salinity and how salinity responded to flow. Now we are simply plotting salinity versus flow. This is a perfect example of why estuarine oceanographers are such a gloomy bunch. Estuaries -- the salinity in estuaries should be dictated by freshwater inflow. We would expect if estuaries operated like a simple bathtub to have a simple relation. The more flow, the lower the salinity but it really doesn't work like that in practice. You can see there's a considerable scatter here ranging over half of the range of salinity -- half of the natural range of salinity, plus or minus -- I'm going to judge --

THE COURT: This is one day?

THE WITNESS: No. No, your Honor. This is over the same two years that we looked at just a moment ago. Over -- I would say plus or minus six to seven parts per thousand, maybe more and there's certainly not a clean relation with flow.

For, say, this value of flow, 3,000-acre feet which is a fairly modest flow, we see salinities ranging from zero to 20 parts per thousand and so it goes. Salinity, in other words, is a very complex variable that is affected by many factors in the estuarine environment.

BY MS. ROBB:

Q Now, Mr. Trungale testified earlier about an analysis he had prepared using three hydrological scenarios. You're familiar with those?

A I am.

Q And do you recall what the three scenarios were?

A Yes. He started with the historical record. I believe he used the period from 1991 to 2009. He started with a historical record for that period. Then he created a scenario in which he removed all of the diversions that were operating during that historical period. I've forgotten the name he gave that scenario but we could call it the "no diversion scenario" as contrasted with historical and then he selected some permitted diversions that -- some permits for which the full permitted amount had not yet been diverted and he hypothesized, let's see what will happen if we have the full permitted diversion for these selected diverters and he called that -- well, I don't what he called it but let's call it the "full permitted scenario."

Q All right. Let's pull up Plaintiff's Exhibit 95.

A He used a mathematical model for hydrodynamics and salinity transport in an estuary that was developed under the auspices of our state agency, the Texas Water Development Board. He used this to simulate salinity over that period of evaluation. Under each of those three scenarios, no diversions, historical diversions and full permit diversions, this is an example of one of the displays that he presented in his report showing these results. This shows on the vertical axis the percent of area occupied by five-part-per-thousand ranges of salinity and you can see the key on the bottom what these ranges are, zero to five, five to ten and so forth up to 25 to 30 and then he collected everything above 30 in just a general basket and that's the dark red area.

The X axis on this display is time. He displays from -- it looks like November '07 through December '09 on a monthly basis. Now, this is a very dramatic figure. He showed one of these for each of the three scenarios. The problem that I had with it is that it's not really quantitative. It doesn't really show us exactly where these isohalines are and exactly what they look like. So through the kindness of his counsel, Mr. Blackburn, they provided me the spreadsheet that he used to develop this figure and I did some additional analysis with it.

Q Let's look at Defendants' Exhibit 275, your table.

A These are the results. What I did was to take the much more detailed data and the spreadsheet of Mr. Trungale and use

that data to compute over the area that he refers to as San Antonio Bay what the average salinity was for each month of that figure. He paid special attention to the period from May '08 through '09 and these results are shown here. Each column corresponds to one of those three scenarios we were just talking about. The "no diversion" is on the left, "historical" in the center. "Full permit" in on the right. This is in order of decreasing flows to San Antonio Bay or putting it another way, in -- on the -- in the order of increasing diversions.

And now if you'll let your eye move down these columns comparing one from the other, let's start looking at the no diversion and historical cases to begin with, you see the differences between these columns vary from month to month. Sometimes they're less than one. Sometimes they're approaching two. There may be a case or two when they're even greater than two. Similarly, if we compare the right-most two columns, historical and full permit where the smaller flows are on the right, we see again there's a difference between the two. Of course we would expect the one on the right to be higher salinity and that's precisely what we see. We see the difference varies.

Now, to try to compress this variation into something that's more assimilable to our human minds, I've just averaged them. So if we could look at the next exhibit, I'll show you

what those averages are.
Q Let's go to Defendants' Exhibit 424.
A Thank you. The top row here, the one labeled 2008 to 2009 is the mean over that entire period from '08 to '09 that was exhibited in his figure. The second row is the period that he was particularly interested in from May '08 to May '09 and I'd like to draw your attention to the difference in salinity between these scenarios. Between the no diversion and the historical, this difference is about 1.5 part per thousand. Between historical and full rights, the difference is about one part per thousand. Qualitatively, I would summarize this as saying the differences are on the order of one part per thousand.
Q And what does this mean with respect to the factors that affect salinity?
A Well, what this means with respect to the natural variability of salinity is that this is -- this would be considered to be noise. It's lost in the noise. We looked at a couple of graphs a moment ago that showed the scatter in salinity and that scatter ranged from zero up to 20-or-so parts per thousand. These are differences of one part per thousand, much smaller than the natural variability.
Q Dr. Ward, is it your opinion that the difference between the three scenarios on the order of one part per thousand, as you've testifies -- testified, rise to the attribution of a

significant difference?
A No.
Q And, Dr. Ward, is it your opinion that these changes in diversions would have an impact on salinity levels?
A Not a significant impact.
THE COURT: What wouldn't have a significant impact?
THE WITNESS: The change in diversion levels that are exhibited here.
BY MS. ROBB:
Q What is the role of water levels in the bay environment?
A Ah, that's one of the other major factors that influences the hydrography of a Texas bay. The main role is that water-level variations are an index to the movement of volumes of water in the estuary which is why we're so interested in them and in particular the forces that bring those movements into play. Probably the most important source of such water-level variation is our old friend the tide and we do have tides on the Texas coast of course. I think I have a figure that will --
Q Let's look at DX 290.
A Good, thank you. This is a plot of one month of measured water levels in the vicinity of San Antonio Bay, that one month being June 2009. This was not a randomly selected month. This was craftily selected after reviewing dozens and dozens of months of data because this is one of the few instances that I

could find when there was a minimum of non-astronomical disturbances to the water level. This is an excellent example of a pure astronomical tide in this region.

Q Dr. Ward, there's a lot going on in this figure. Could you either use the monitor to point as you talk about it or use the red dot?

A Sure. Let's start with the dark blue trace. This is the water levels measured at Bob Hall Pier which is a time gauge that's located in the Gulf of Mexico on the beachfront just down from Corpus Christi. This is an excellent monitor for tidal variations in the gulf and several things are immediately apparent as you look at this one month of data. First, there is a substantial variation in the range of tide. It ranges from as high as -- now, in my attempt to I guess induce confusion, now we're talking about units in feet. It ranges from a high of maybe 3 feet or more to as little as a few inches here and here.

Moreover, it has a clean -- what oceanographers refer to as diurnal variation. This means you can see this rise and fall here. That takes place in almost exactly 25 hours, so the very nice, clean, classical tide on the Texas coast. Now, the other two traces are measured inside the estuary, one in a station located in Mesquite Bay, the other in lower San -- well, it says lower San Antonio Bay. Actually that is at Seadrift.

Q So, Dr. Ward, the Mesquite Bay is the red line?
A The red one. Seadrift is the green and I have displaced those two so we can look at them better. If I'd plotted them on a common datum, they would have all been bunched right here in the center and you would have really had complaints with this figure.

Now, several things to comment about the tide in San Antonio Bay -- first of all, its range is much smaller than the Gulf front. We were talking about as much as 3 feet or more on the beachfront at Bob Hall Pier. Inside San Antonio Bay, we're talking about 4 to 5 inches, much smaller tidal variation but we still see the same variation in range. There's a greater range in this part of the cycle than there is in this part of the cycle. That range varies with a 14-day period discipline.

If we were to -- if you allow your eye to kind of trace through this variation and ignore the diurnal fluctuation about it, you can see that there is an additional rise and fall in water level that has a period of about 14 days. This is called the "fortnightly" period and that too has a range in San Antonio Bay of 4 or 5 inches. Now, these variations are caused by the relative influence of the sun and the moon on water on the surface of the earth acting through the agency of gravity. So these variations are locked into the position of the sun and the moon in the sky and are completely predictable.

These can be predicted years in advance. This is what we refer to as the "astronomical tide" if we want to be precise but colloquially we call it the "tide" and it is a natural and ubiquitous source of water variation both on the beachfront and within the estuaries.

Q Let's look at Defendants' Exhibit 291 and what does this figure tell us?

A This tells us that there are still other variations in water level. Before we were looking at a one-month period and we were seeing variations on the order of a day and on the order of a fortnight. Now I have taken a one-year period -- this is Bob Hall Pier out on the Gulf of Mexico. I've a taken a one-year period and smoothed it with a 29-day running mean. Why in the world would someone do something like that? Well, 29 days is perfect to take out those smaller astronomical frequencies that we were just looking at. So that is now removed and, lo and behold, we see water levels still rise and fall.

Now, I did this originally with using 21 different years and thankfully I haven't shown all 21 years on this same graphic because it would look like an explosion in a noodle factory. Instead, I've selected four years which are the -- shown as the very fine lines and there are labels on the years that I've selected. The other years I haven't plotted but I've shown the high and the low points. The blues are the low

points. Here are some blues. The highs are the red points and this bold, dark blue trace is the grand average day by day over this 21-year collection of annual variations.

Now, all of these graphic representations tell us that this variation is showing high waters in the spring, high waters in the fall, low waters in the summer and low waters in the winter. This is called the "semiannual secular tide" on the Gulf of Mexico. The word "tide" should be in quotes. Part of it is astronomical. Part of it is climatological. Part of it we don't understand. This remains one of the physical oceanographic mysteries of the Texas coast. Why in the world do we have a secular semiannual tide?

For present purposes, the important point is that even if we take out the normal tide variation, there is still a substantial rise and fall in water level as you see here and this is in feet from the lowest winter values, which are generally the low water -- the lowest waters of the year, to the highest fall values. There is a range of 2 feet or so in difference in elevation. This secular tide has no attenuation as it passes through the inlets into the estuaries behind the islands. This secular tide passes through unattenuated. We see the same kind of variation in San Antonio Bay as we see at Bob Hall Pier.

This is an extremely important source of water exchange for San Antonio Bay and for the rest of the bays

behind the barrier islands. It's a fundamental feature of Texas hydrography and one of the important sources of water-level variation. It is, however, unlike the astronomical tide, not predictable. We can expect a low water in winter. We can expect a high water in October but we cannot predict from year to year how high the high waters are going to be or how low the low waters nor can we predict with any precision when those events are going to occur.

Q Dr. Ward, I'm going to push this clear button.

MS. ROBB: Your Honor, how am I to clear the red? Do you have the button? Thank you.

BY MS. ROBB:

Q Is there anything else that you would like to discuss about this figure before we move off it? I just thought I would get your marks off for the next one.

A I think I'm finished with this figure.

Q All right. Are there any other sources of water-level variation on the coast?

A Well, yes, there are. Freshwater inflow is a source of water-level variation, particularly the flood events. We know that within the river channels and the flood plains of our state and including the San Antonio and Guadalupe River, these entail considerable vertical changes in water level. That's why we call them "floods." When they move into the bay, they also create a rise in water levels, sometimes substantial, not

as much as we see in the flood plain of course because there's more water area for the flood pulse to be spread over in a bay but still flood pulses can contribute a substantial water-level variation and that is a source of variability.

Q Let's look at Defendants' Exhibit 292.

A Well, this is yet another source of variability. We seem to have no end to sources of water-level variability, do we? This is a pair of -- this figure shows three different pairs of displays. Each pair consists of a plan view of the state of Texas and a cross section. The plan view shows the five-state area and Mexico and is a simple schematic of meteorology. This one is showing the normal on-shore flow from the Gulf of Mexico. This is what we enjoyed yesterday. This is typical of our stable climate in this part of the world. This is part of the trade winds. It's a branch of the trade winds circulation. The right panel shows a cross section that runs from the land on the left to the Gulf of Mexico on the right. The barrier island is shown here, the bays behind the barrier island here. This could represent San Antonio Bay.

This is the water surface. The dark blue is water; light blue is the overlying atmosphere. Under the normal onshore flow from the Gulf of Mexico, the southeasterlies, there is a setup of water level which means a rise in water level caused by the movement of water from the Gulf of Mexico toward the barrier island on the seaward side of the barrier

island. On the leeward side, there's a depression of water level and then a setup on the landward side of the bays. This is the normal configuration.

Now, one of the sources of disturbances that is a prolific generator of water-level variation is the frontal passage. This is shown diagrammatically in the second pair of panels. Here you see a front entering Texas in the northwest of the state. Now, a front insofar as the low level winds are concerned is a zone of conversions. Think of it as a gigantic vacuum cleaner that's moving across the state. Ahead of the front, it draws flow -- draws winds into the frontal zone from the southeast to the front. Behind the front, we have north winds blowing into the frontal zone. As this front approaches the coast, it enhances the normal onshore flow. So our southeasterly winds increase in speed and response and that's shown here.

Because these southeasterlies are increasing in speed, they create more setups. So water levels rise more on the bayward side in the Gulf of Mexico. Water levels are depressed to the lee of the barrier island and then elevated on the landward side of the bay. You can see the slope and water surface that is created by these freshening southeasterly winds. This creates a change, a difference in water level across the barrier island, what the hydrolicians call a "head," a pressure difference that drives water from the Gulf of Mexico

into the bays through the tidal inlets. This flow of water begins to fill the bays as the front approaches.

Now, the next panel shows the state after the front has cleared the Gulf and is now off shore. Now the state is under the influence of north winds. The winds are shown reversed here in this cross section now blowing from left to right which is supposed to represent north winds. These north winds also create a tilt in water surface but now it's the other direction. Water surfaces are elevated behind the barrier islands and depressed in the upper part of the bays. Water surfaces are depressed off the beachfront and elevated far out in the Gulf of Mexico. This also entails a difference in water level across the barrier island but now it's in the opposite direction from before. Now the water level is higher in the bay, lower in the adjacent Gulf of Mexico which drives a water transport through the inlets from the bay to the gulf.

Now, this represents -- this whole sequence of the frontal approach and then the frontal passage represents a very large exchange of water, first from the Gulf of Mexico into the bay and then blown out from the bay into the Gulf of Mexico. The volume of water that's involved of course varies with the properties of the front but it's typically on the order of and often exceeds the volume of water carried by the tides, by the astronomical tides.

On the upper coast, our estuaries like the Sabine

Lake, Galveston Bay, Matagorda Bay can have as much as half of their volume evacuated by a vigorous frontal passage. We don't see quite that dramatic an exchange in the lower bays including San Antonio but still the proportion of volume of the bay that is blown out during a frontal passage is substantial. Why is it less in the lower bays than the upper? Two reasons, the upper bays have much broader inlets and a much more vigorous exchange with the sea which allows this water to be carried out whereas Aransas Pass and Pass Cavallo are comparatively smaller inlets and more resistive to water transport. The other reason is that the fronts tend to weaken as they move into this latitude. So we don't get quite as much punch as the bays on the upper coast do but this is an important source of water-level variability in the bays. We get about 50 frontal passages a year of varying intensity and properties.

Q Let's look at Defendants' Exhibit 279.

MS. ROBB: And, your Honor, may I ask that we clear the red marks? May I ask that we clear the red marks?

THE COURT: I'm sorry.

MS. ROBB: Thank you.

BY MS. ROBB:

Q What inferences do you draw from this figure that would affect San Antonio Bay?

A This is a ten-year record of water-level variation measured at Seadrift in San Antonio Bay where I have smoothed

it with a 14-day average. This is equivalent to using the 29-day average to remove the normal astronomical tidal component but the other sources of water-level variation are still here, the semiannual secular variation, the variations due to freshwater inflow and the variations due to meteorological or wind tides, as we call them, and as you might expect, if you let your eye flow over this diagram, you can see the periodicities of the semiannual variation.

I've also put two lines that correspond to the elevations of 0.3 and 0.2 across the diagram just to help our eyes track what's going on. Now, the point to be made here is that these nonastronomical phenomena frequently combine in various ways to create unusually high water and unusually low water. As we might expect since winter is a low-water season, we see winter frequently here and there are a few winters that achieve extremely low values. These are shown here 2000 -- winter of 2000-2001, winter of 2005-2006 and winter of 2008-2009. I also did a graph like this for the preceding decade and there was one more that occurred on that graph, '97 to '98, the point being that winter of '08-'09 was unusual in the respect that these nonastronomical sources of water-level variation combined in such a way as to lower the water levels in San Antonio Bay to unusually low values and that is my point.

Q So, Dr. Ward, is it your opinion that besides the normal

and natural tidal variations in San Antonio Bay, water levels in the winter of 2008-09 were unusually low due to a combination of natural forces?

A It is.

MS. ROBB: Pass the witness.

(Pause)

MR. BLACKBURN: May I proceed, your Honor?

THE COURT: Please.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Well, George, we've come close to this before but we haven't gotten here previously but I'm going to call you Dr. Ward just for the record that I might mention it's good to see you in a coat and tie.

A Thank you, Jim. I will call you Mr. Blackburn for the record. I hope we can finish before 5:00 because this tie needs to be back at United Rental.

Q Among other things, you're known for your pecuniary diligence, right?

A Yes, sir.

THE COURT: One of the great things about this witness is that he looks like a professor.

MR. BLACKBURN: He has certainly got that look. In --

THE COURT: He does.

MR. BLACKBURN: -- in depositions, he really has that look.

BY MR. BLACKBURN:

Q Now, just to get a few, kind of, preliminary things out of the way, you come here offering a thought or two about Joe Trungale's expert testimony here in trial. Were you here when Joe testified?

A I was not.

Q So you're commenting off of Mr. Trungale's expert report and kind of what you understood he was likely to say here in trial but you can't really -- you don't really know exactly what he said, right?

A That's exactly correct.

Q And it probably is pretty close. I don't think there's a lot of difference. I just wanted to see if you were here or not. I didn't recall it.

Now, as I understood your testimony, you're not challenging how Joe ran the TxBLEND model?

A That's correct.

Q I mean, if he punched all the right buttons for whatever day that was input, you're not challenging that whatever came out was sort of accurately, technically completed?

A No. Joe is a very competent engineer and I'm confident he ran the model correctly.

Q And TxBLEND, the model of concern here -- while I

understand it's not your favorite model, you have recommended to, for example, the Galveston Bay BBEST that the TxBLEND model be used for salinity determinations in Galveston Bay, right?
A Yes, sir.
Q And you would agree with me that it's the official model of the state of Texas?
A It is the only model of the state of Texas.
Q Which would mean you agree with me it is the --
A That makes it the official model --
Q And --
A -- whatever that means.
Q It is the model developed by the Texas Water Development Board?
A That's correct.
Q And it is the model that is routinely used up and down the Texas coast?
A Yes, sir.
Q And that model was both validated -- both calibrated and validated by the Water Development Board, right?
A They issued reports with those titles, yes, sir.
Q And I understand that you have some issues about how all of those things were done but basically they certified it, right?
A Yes, sir.
Q Government agencies ever do anything that you don't agree

with?
A Oh, my. I would have to think for a bit.
THE COURT: Don't even go there.
BY MR. BLACKBURN:
Q Now -- so what we're talking about really with regard to the computer modeling that was done is what to make of it, what to -- how to interpret the results, things like that, right?
A Yes, sir.
Q Now, if I can work my way back through my notes, I think it's Exhibit 280. It's the one that's the estuary.
THE COURT: Plaintiff?
THE WITNESS: Defendants'.
MR. BLACKBURN: Defendants' 280.
BY MR. BLACKBURN:
Q And this is your fine diagram of an estuary, right?
A Yes, sir.
Q And it has all of these colors that go from the ocean, which I've just presented some are 32, 33 parts per thousand, something like that?
A Thirty-five.
Q Thirty-five, so you're pushing it on up there.
A Well, that's the way it is. The Gulf of Mexico though gets diluted by a lot of inflow, particularly from the Mississippi Basin. So typical salinities in the Gulf range 32 to 33.

Q So around our part of the world, 32 to 33?
A Yes, sir.
Q And you've got a bunch of little lines that look -- or areas that look like they get kind of progressively, what, lighter blue as you move up the estuary?
A That was the intention.
Q And the intention would be to display gradients of salinity declining from 32 to 33 up to perhaps near zero?
A Yes, sir.
Q Now, if you were to demonstrate or to illustrate the concept of estuary by putting a single dot there, averaging all those salinities and putting an average salinity like there's so much area with five parts per thousand, so much with ten, so much with 15, so much with 20 --
A Uh-huh.
Q -- 25, 30, et cetera -- if you average it all and put it in one dot and colored it all the same color, you would have just destroyed the concept of an estuary, right?
A It would depend upon why I'm doing it.
Q Right. But in terms of illustrating --
A I would certainly not do it for this purpose.
Q Right. To illustrate an estuary, you wouldn't?
A That's right.
Q But to criticize Joe Trungale's expert report and opinion, you did do that.

A I did that because we're dealing now with a single estuary that is being -- that is having its freshwater inflow altered under three different scenarios. If I were to take this simple diagram and you were to ask me, okay, show me what the salinity within this estuary is going to look like under these three inflows -- that's high, medium and low -- then I would do probably precisely what you just said. I would draw lines and say, okay, this is our estuary. Let's calculate the average salinity contained within this volume under the three different freshwater inflow scenarios you want me to evaluate and, look, one of them is five. One of them is 15. One of them is 25, say.

Q But isn't what you did a misrepresentation of Joe's results which was gradients?

A No.

Q He had several -- do you disagree that Joe had several different gradients that were the product of his computer modeling?

A He showed three different figures that indeed showed gradients, relatively small changes from one to the next but, yes, there was a gradient.

Q And those gradients of -- were illustrated --

MR. BLACKBURN: And if I could have Plaintiff's Exhibit 106. And if I could get you to -- your Honor, to remove the red lines, please.

THE COURT: Sometime you can show them how to do it, Ms. Gano.

THE CLERK: Yes, your Honor, I will.

BY MR. BLACKBURN:

Q In this case the way this is presented, it's just the area of the bay that is less than 25 parts per thousand?

A Yes, sir.

Q And that indicates a geographic coverage of certain levels of salinity, right?

A That's correct.

Q Now, in your review of -- in your critique of Joe Trungale's work, you didn't mention anything about geographic coverage, right?

A That's correct.

Q And isn't, in fact, the geographic cover and the geographic distribution of various salinities a key aspect of the estuary?

A It is.

Q And in these illustrations, we're talking about changes, for example, October of '08 from 35 percent of the bay being less than 25 parts per thousand to 9 percent to -- I don't know, it looks like 6 percent if I can read it and it's your testimony that's not a significant change?

A What we're not seeing here is the distribution of salinity. We're looking at the area enclosed within the 25-

part-per-thousand isohaline. Now, imagine with me, if you will, that we have a very shallow gradient of salinity, let's say, so that we have 24 on one side of the bay and 26 on the other. We change the inflows and, lo and behold, that 25-part-per-thousand moves from clear on one side to clear on the other and we say, look at how much area it now occupies which it didn't before and yet the salinities involved still range from 24 to 26. The point is you -- if you use only areas without looking at where exactly these salinities are, you're missing part of the comparison and you may actually be distorting the differences.

Q And --

THE COURT: Do you only use one measure? Do you only use the one gauge for your figures, those in the lower left-hand corner?

THE WITNESS: No, this was not -- your Honor, this work of Mr. Trungale's was --

THE COURT: No, I'm talking about you.

THE WITNESS: What I did?

THE COURT: Uh-huh, when you talked -- measured the salinity, you used that one robot thing?

THE WITNESS: Yes. When I was showing the diagram of how salinity responds to flow in San Antonio Bay, I was using only data of GBRA Number 1.

THE COURT: Right. So -- I mean, that could distort

what the whole bay is also?

THE WITNESS: Well, yes. Yes, indeed.

BY MR. BLACKBURN:

Q But isn't the intent of the TxBLEND model to the best of our abilities today an attempt to predict those distributions not from one -- necessarily from one side of the bay to the other but relative to different zones to project how those zones of salinity appear and occur throughout a bay system?

A Well, the intent of TxBLEND is to predict salinity throughout the bay. That is exactly its intent and what we're doing here is trying to take that very complicated model output and kind of pre-digest it in a way that we can better summarize what the model is telling us.

Q And you took a whole year's worth of data, condensed it down to one number and said it's not significant, right, George?

A That's -- I took the San Antonio Bay and I averaged it over the entirety of San Antonio Bay for several different time periods and looked at the differences among the three inflow regimes and found that among those three inflow regimes, salinity didn't change that much.

Q Now --

A That average did not change that much.

Q And in your work, did you at all refer to the analysis that Dr. Sass did as part of the Plaintiff's case where he

analyzed whooping crane mortality versus certain inflow time periods?

A No.

Q So you --

A I've looked at that but I'm not testifying --

Q Right.

A -- or commenting on it.

Q But these terms -- the times for times for which you picked for significance were for an entire year, correct?

A I used the same time periods that Mr. Trungale used.

Q But Mr. Trungale produced results that were available on a month-by-month basis, right?

A He did and I used those results.

Q And you came up with averages across the entire year, right?

A I also had averages month by month which I showed you in my table.

Q And if I asked you to pick the months out that Dr. Sass identified as the critical months for inflow for the whooping cranes, could you do that?

A Well, since I don't recall what the critical months he identified were, no, I couldn't but if you tell me, I would be glad to pick them out.

Q But in terms of significance, if significance is in fact salinity levels that kill whooping cranes, might it not be

important for you to have looked at that?
A I was testifying to the significance of salinities vis-à-vis blue crab but I didn't mention that because you didn't want me to talk about biology.
Q And I won't. Now -- well, I will. Now, did you review Dr. Montagna's most recent report?
A Yes, I did. Oh, pardon me -- most recent report?
Q In this case. He -- there was an amended report that he filed.
A Oh, yes, I skimmed it. I skimmed it. I did not give it a close reading.
Q Are you aware that he had done a boosted regression tree analysis that --
A I am.
Q And he came up with the salinity range of from 10 to 25 parts per thousand?
A He came up with a relation between the probability of abundance of blue crab versus salinity that seemed to show a local maximum in the -- in that range of salinity.
Q And is that the salinity range that you used when you were saying you evaluated salinity relative to blue crabs?
A No.
Q So you made your own determination, correct?
A Blue crabs are euryhaline and they may have a preference for zero -- for the 10 to 20 range that Dr. Montagna pointed to

in his boosted regression tree but we find them from fresh to saline salinities throughout our Texas bays. They're ubiquitous.

Q He actually testified to 10 to 25 for San Antonio Bay.

A I'm sorry. Thank you. The point remains they are euryhaline. They are ubiquitous. They --

THE COURT: I don't know what that means.

THE WITNESS: That means they are --

THE COURT: Euryhaline. I know what ubiquitous is.

THE WITNESS: -- insensitive to the specific salinity that they're in --

THE COURT: Okay.

THE WITNESS: --- but they may prefer the range that Mr. Blackburn just stated which I think would need some examination but they certainly survive and even thrive in other salinities. We find them in the laguna, don't we?

BY MR. BLACKBURN:

Q Now --

THE COURT: Do they live in Nueces Bay?

THE WITNESS: Blue crab? Yes, ma'am.

BY MR. BLACKBURN:

Q Whenever the salinities are in certain ranges. You get salinities up too high, then there -- the booster regression tree analysis that Dr. Montagna testified about indicates that the abundance decreases significantly. There's the bell-shaped

curve that he presented. The one for Nueces Bay is actually a little bit different than the one for San Antonio Bay according to Dr. Montagna.

A Actually it's quite different.

Q Yeah.

THE COURT: What's that noise? Is that interfering with your recording?

COURT SECURITY OFFICER: Yes, your Honor.

THE COURT: Okay. Let's stop for a minute. Why don't you see where that's coming from?

COURT SECURITY OFFICER: That's the air conditioning unit.

THE COURT: Pardon?

COURT SECURITY OFFICER: It sounds like the air conditioning unit.

THE COURT: Would you get maintenance?

MR. BLACKBURN: There it goes.

THE COURT: It's gone. Let's try -- let's start over and see if it happens. Go back, thank you. Ms. Cayce, why don't you at least -- there it goes.

MR. BLACKBURN: It's back again.

THE COURT: Go ahead. Any time it stops, go ahead. We're on it.

MR. BLACKBURN: I understand. I understand.

THE COURT: Give a smooth examination.

MR. BLACKBURN: Do I get difficulty points up here?

THE COURT: You do. It'll come out at about a 9.7, your performance with a degree of difficulty added in.

BY MR. BLACKBURN:

Q Now, I was curious about something that you said. First of all, that on San Antonio Bay, the inflow hugs the -- essentially the shoreline of Blackjack Peninsula. Is that fair?

A Yes, sir.

Q So that makes any water that's coming into the bay, any freshwater pulses coming in will directly benefit that Blackjack Peninsula, that portion of the bay, correct?

A It would certainly affect that portion of the bay.

Q So it could be very useful if I were concerned about trying to get freshwater impacts down to the whooping crane territories?

A It could. You have to remember that while that water is moving from south to north and hugging the right -- the descending right bank, it is also subjected to mixing, very intense mixing. So it's changing.

Q That would be what's picked up in TxBLEND, for example?

A In principle.

Q Now, I'm going to ask you something that on the face of it may sound silly but from a salinity standpoint, does the bay have a memory in the sense that whatever the antecedent

salinity levels are over a period of time may be harder to remove if -- the higher they get and that they will stay longer if they had been there a long time? Does that make any sense?
A It did until that last phrase and I'm not entirely sure what that means but when there's --
Q Go ahead.
A -- this sounds similar to the description that I was giving earlier about the sluggishness --
Q But that's what I was kind of --
A -- of the salinity response to freshwater inflow.
Q That was where I was kind of going. I mean, when you say "sluggishness," it's sort of like, kind of, wherever the status quo is in that system, it's going to tend to want to hold onto it -- I say it wants to. I'm probably using the wrong terminology for you. You're grimacing up there. So how would you explain it?
A Well, I would probably explain it the way that I tried to by simply saying that it's sluggish. What makes me uncomfortable about the idea of the bay holding onto salinity is -- that suggests that if the bay is very salty, for instance, it might be more resistive to a freshwater sub-pulse entering the bay compared to if it were, say, brackish and that's not the case. If it gets hit with a substantial flood impulse, that flood water will replace the water that's there before whether it's 20-part-per-thousand or whether it's 40.

Q But if we're talking lower inflows -- if we're talking about impacts of smaller quantities of inflows, for those to have an optimal impact on salinity, it would be very helpful to have the salinity levels as a starting point, not in the 35,000 -- 35 parts-per-thousand range.
A I think the fractional reduction you're going to get in salinity will be the same under either scenario.
Q Well, then put another way, if you're trying to get into a certain range, the closer you are to that range as a starting point, the better.
A If you want to get into 20, let's say, and you're already at 19, that's an easier thing to accomplish than if you're at 20 and you're already -- and you're at zero.
Q Well, that's --
A Is that what you're saying?
Q I think I'm turning it the other way around.
A You're talking high salinities. Is that the same --
Q I'm talking about reducing the high salinities.
A Same point. If you want it to be 20 and you're already at 21, it's easier to get to 20 then if you start at 30 or 35, sure.
Q So -- but if one were thinking about managing this bay system and trying to optimize inflows, the more you could maintain and the nearer to the range that you were concerned with, the easier it would be to bring levels back down into a

certain range if you didn't have as far to go, right?
A I'm getting a picture here of -- if you want to maintain a car going 60, it's easier to give it little impulses of fuel to keep it right around 60 than it is to get to 60 from a stationary stop.
Q That's sort of -- that's not --
A Is this kind of what you're --
Q -- that's not unlike the image I'm talking about.
A Just so we're together on our metaphors.
Q And you would agree with that?
A It sounds reasonable.
Q Now, Joe Trungale did a historical overview. He did a diversions taken out to kind of move it back toward at least less human interference and then he had full utilization of certain permits to push it at the other end?
A Yes, sir.
Q Now, in terms of his performance of those calculations, did you have any criticism of that?
A I believe he ran the model correctly.
Q And he --
A I have no reason to doubt that.
Q -- and he created those scenarios correctly?
A I haven't looked at that in detail. I would observe that he appears to have neglected return flows.
Q And he did not include domestic and livestock -- he took

nothing out for domestic and livestock?
A Well, that's sort of a different area. That's a mystery to us but we do know about return flows.
Q And isn't it a fact the wind doesn't include the return flows?
A I'm sorry?
Q Never mind, withdraw that. Let me turn to water levels and tides.

MR. BLACKBURN: Could I have Exhibit 292, please?

Q Now, are you aware that this testimony that you've given about tides corresponds to some work that will be testified a bit later by Dr. Davis?
A Yes, sir. That was the point of it.
Q So you're doing essentially the setup for Dr. Davis with what you have put into evidence here with your understanding of the way the water moves?
A Yes, sir.
Q And -- I'm sorry, let's -- I'm going to come back to 292.

MR. BLACKBURN: Would you go to Exhibit 413? And would you hone in on the color map as best you can? Well, we have two of it. That ought to work. That works in some way or another. I don't think we can enlarge it very much.

Q Have you seen this map previously, Dr. Ward?
A It looks -- I'm sorry. It looks familiar.
Q Well, I will represent to you that these are study sites

from the SAGES project and it's my understanding Dr. Davis will be coming in and testifying about those three squares that are shown here which are test sites. We've had prior testimony about Dr. Greer doing some testing in these squares and I think Dr. Davis also will testify that he did work there. Do you see those three squares?

A Yes, sir.

Q One red one, one green one, one blue one.

A Technically, two of them are rectangles.

Q I stand corrected. Now --

THE COURT: See, that's a real scientist.

MR. BLACKBURN: He is. I mean, Dr. Ward is on it, I got to tell you.

THE COURT: Uh-huh.

MR. BLACKBURN: You've got to watch Dr. Ward.

BY MR. BLACKBURN:

Q Now, have you ever studied any of those three areas?

A No, sir.

Q Now, did you review Dr. Davis' methodology about how he did water levels in those marsh studies?

A Yes, I did. I read his paper as well as the master's thesis that his student had prepared.

Q And are you aware that in his final analysis, he dropped one of those three sites?

A I don't recall that but I will accept it.

Q And --
A Did he say why?
Q I think that will be subject of cross examination. The question I've got for you though, Dr. Ward, is those three sites are all on the -- I guess the north side of the Mesquite Bay-Carlos Bay complex?
A Yes, sir.
Q And as can be seen on the diagram up in the left, there's an island structure to the, I guess, south of those test sites?
A Yes, sir, from the Gulf Intracoastal Waterway, the spoil -- pardon me -- sediment disposal.
Q And I will ask you now about --

MR. BLACKBURN: I ask now to pull up Exhibit 292.

(Attorneys conferred)

MR. BLACKBURN: There, good. And if you would hone in on the one, the third example at the bottom.

THE WITNESS: Yes, sir.

BY MR. BLACKBURN:

Q I was actually directing that at my helper over here but you too. I want you looking at that as well.
A I was honing in also.

MR. BLACKBURN: And just for your information, we'll be going back to 413. So just be ready.

MR. UNIDENTIFIED: Okay.

//

BY MR. BLACKBURN:

Q Now, what you have shown here, Dr. Ward, is that when this cold front comes through that essentially the wind blows from the north or from the northwest, depending on what the angle is and it blows water across the bay and it piles up on the barrier island, right?

A Yes, sir.

Q So if one had monitors on one side of the bay and on the other side of the bay under this example, they would read different things, right?

A That's exactly right.

Q Okay. And in this situation when the water level would be low on the mainland, it would be high on the island, right?

A Yes, sir.

MR. BLACKBURN: Now, would you go back to Exhibit 413, please?

Q Now, did you review or evaluate in any way the methodology used by Dr. Davis?

A I reviewed the part of the methodology by which he determined a threshold level of what he called "connection" between his pond and the adjacent bay. He looked at this by examining the correlation between the water level in San Antonio Bay as measured at Seadrift and the water level in his study area where he had deployed a temporary water-level monitor. He examined these for the -- well, normally the water

levels at these two monitors are uncorrelated but he discovered that as water levels rise, there was a point at which their variation became correlated. I guess waving my hands doesn't do much for the record, does it?

Q It doesn't help at all but it really looks entertaining from here.

A Could we say, "Witness flails hands"?

THE COURT: In desperation.

MR. BLACKBURN: In desperation, the witness flailed.

BY MR. BLACKBURN:

Q My question to you is, are you aware that in his determination of conductivity, Dr. Davis dropped one of the three sites?

A You said that and I don't recall it.

Q And in terms of your testimony today, you can't testify at all about his thought -- I mean, about the methodological basis for his dropping that?

A I cannot. I was hoping you would tell me.

Q Now --

MR. BLACKBURN: May I take a minute, your Honor?

THE COURT: Yes, sir.

(Pause)

BY MR. BLACKBURN:

Q Just to make the record clear, you didn't do any of your own modeling?

A No, sir.
Q And you didn't run any alternative salinity scenarios other than the averaging document data that you put into the record?
A I relied on Mr. Trungale's work, yes, sir.
Q And --
MR. BLACKBURN: Let me pull up, please, DX 279.
Q And in looking at this data, you show a low-water event really at 3 point -- three times it comes down to the .2 level. Do you see that?
A Yes, sir.
Q And there's one in the 2008-2009 time period. Do you see that?
A Yes.
Q Would you agree that that is a short-duration event compared to the 2005-2006?
A The -- you're defining the event as the time that it's below 0.2?
Q About the low -- yeah, the low 0.2.
A Well, the reason for the 0.2 -- the 0.2 value has absolutely no significance other than to help our eye compare the low points that you're seeing on this graph.
Q So you meant nothing with that line?
A That has no physical significance -- there's no physical significance intended.

Q Okay.
A It's simply to help inspect the curve.
MR. BLACKBURN: Thank you, your Honor. No further questions.
THE COURT: Thank you.
MS. ROBB: I have no further questions, your Honor.
THE COURT: Then you're excused.
THE WITNESS: Thank you.
(Witness stepped down)
THE COURT: I guess this is a good time to take our 3:00 o'clock break.
MS. ROBB: Thank you, your Honor.
THE COURT: How many more witnesses do you have?
MS. ROBB: We have two more today.
THE COURT: Oh, okay.
MR. BLACKBURN: I was thinking we were through, your Honor.
THE COURT: No.
MS. ROBB: Your Honor, we have seven.
THE COURT: Wait. Okay.
MS. ROBB: Your Honor, we have -- the Defendants have seven total additional witnesses.
THE COURT: Okay, good, thank you. And this is Wednesday. So we ought to --
MS. ROBB: This is Wednesday.

THE COURT: -- do some more on Thursday and Friday.

MS. ROBB: Yes, your Honor.

THE COURT: Long witnesses, you think?

MS. ROBB: Medium.

THE COURT: Okay.

MR. BLACKBURN: I think I can represent for most witnesses, the cross will be relatively quick.

THE COURT: Who knows?

MR. BLACKBURN: You don't believe that, your Honor?

MR. FERNANDES: Everybody is gauging what I'm saying when we're trying to go home Friday.

THE COURT: I know.

MR. WILLIS: Have you given any thought, your Honor, as to what you'll allow on the closing situation -- closing argument?

THE COURT: Well, anything you will want, I'll listen to. I just thought you might want to take the opportunity to put in a brief instead of oral arguments --

MR. WILLIS: That's fine.

THE COURT: -- and then after the briefing if you think you want oral arguments, I can do that too. How's that?

MR. WILLIS: That's fine.

MR. BLACKBURN: That would be my preference, your Honor.

THE COURT: So I kind of want to keep listening to

you-all.

MR. WILLIS: So you want a good hour a piece?

THE COURT: Do I have to be here? No, you-all are doing great. You know I'm kidding.

(A recess was taken from 2:58 p.m. to 3:24 p.m.; parties present)

THE CLERK: You may be seated.

THE COURT: Would you call the next witness?

MS. ROBB: Defendants call Samuel Vaugh.

THE COURT: Did you get that, Ms. Gano?

THE CLERK: Yes, your Honor.

THE COURT: Okay.

SAMUEL VAUGH, DEFENDANTS' WITNESS, SWORN

MR. BLACKBURN: Your Honor, Mr. Irvine is going to take the cross examination. Would you prefer him to sit up here or is it okay for him to stay back there?

THE COURT: Anyplace you want. Have a seat. How do you spell your last name?

THE WITNESS: Your Honor, it's V-a-u-g-h.

THE COURT: Thank you very much.

DIRECT EXAMINATION

BY MS. ROBB:

Q Please introduce yourself to the Court.

A My name is Samuel Kent Vaugh.

Q Mr. Vaugh, let's talk about your background. Please take

a look at Defendants' Exhibit 241. Is that a true and correct copy of your CV?

A It is.

Q Can you briefly describe your educational background?

A Yes. I have a bachelor of science in civil engineering from Rice University and a master of science in civil engineering specializing in water resources from the University of Texas at Austin.

Q Do you have professional licenses or certifications?

A Yes. I'm a registered professional engineer in the state of Texas.

Q And where are you employed?

A I'm employed at HDR Engineering, Incorporated in Austin, Texas.

Q How long have you worked there?

A I have worked at HDR Engineering for 26 years.

Q And what are your responsibilities at HDR?

THE COURT: What is HDR? I'm sorry. Where are you?

MS. ROBB: Let's go to the next page. It's down at the bottom, Professional Endeavors, HDR Engineering, Inc.

THE COURT: Thank you. Where is that?

THE WITNESS: Your Honor, we are a nationwide company of about 7,000 employees headquartered in Omaha, Nebraska and I am located in the Austin office.

THE COURT: Thank you, sir.

BY MS. ROBB:

Q And what are your responsibilities at HDR, Mr. Vaugh?

A Well, my responsibilities are threefold. I -- excuse me. I'm -- I have three titles. So that sort of goes along with my responsibilities. I'm a professional associate which is an indication that I am a technical expert within our company. I am a project manager which is self-explanatory. I manage projects for clients and I am a vice president which means that I engage in client service and community service activities on behalf of the company.

Q Could you please describe the type of work that you currently do?

A Yes, I do primarily river basin hydrology, regional water supply planning, water rights permitting, river basin modeling and model development and statistical analyses.

Q And could you describe some of the modeling work that you've done in the past?

A Yes. In the course of my career, I have developed river basin models in the Guadalupe-San Antonio River basin and in the Nueces River basin from the ground up essentially beginning with naturalized stream flows which are the flows that would occur in the river absent the impact of man which is the fundamental basis for water availability modeling and have integrated in those models accounting for surface-water rights and accounting for channel losses, the fact that a hundred-acre

feet of water in the upper end of the basin does not all make it to the lower end of the basin because of evaporation and losses through aquifers and so on. That integration and channel losses in river basin and water-availability models was something that I believe I was the first to do in Texas water rights.

Q Does your work include water planning?

A Yes. I work in water planning at the -- through the State of Texas Senate Bill 1 process by which the state is broken into 16 regions that develop regional plans and those are combined into the state water plan on a five-year basis. I focus particularly on one of those 16 regions, Region L which includes the Guadalupe-San Antonio River basin.

Q Does your work include water permitting?

A Yes. I have assisted a number of clients over the years in applying for new water rights and for their considerations of other applicants of water rights and then of course in developing the water-availability models for the State of Texas, I understand how those rights are operated from a legal perspective and from a hydrologic perspective.

Q And in how many river estuary systems have you been involved?

A I have done work in every major river basin in Texas from east to west with the exception of the Rio Grande and I have worked in the Guadalupe Estuary and the Nueces Estuary systems.

Q How long have you been working in the field of environmental flows and river-basin hydrology?
A Essentially my entire career, so that would be about 29 years.
Q Do you have training in statistical methods?
A I do have some training in statistical methods. In graduate school where I specialized in water resources, I took courses in statistical methods in hydrology, in stochastic processes or time-variant processes in hydrology and in the course of my work, statistics and those kinds of evaluations are part of what I do.
Q And as part of your work in the basins, have you used statistical analyses to determine the relationship among different variables?
A Yes, I have. For example, I mentioned earlier the development of naturalized stream flows for the water-availability models for the state. Well, because all gauge records are not continuous through the entire period of record going back to the 40s, sometimes you have fill in or estimate those missing records and I've applied regression techniques to fill those in and tested the significance of the regression coefficients. I've also looked at trend analyses to try to assess whether, for example, flows in a river have changed over time or whether rainfall affecting a watershed has made a statistically significant change over time.

Q Are you currently a member of the Basin and Bay Expert Science Teams?
A Yes. I serve on three Basin and Bay Science teams, in the Guadalupe-San Antonio, the Nueces and on the Sabine-Neches Science teams.
Q How did you become a member of these science teams?
A I was appointed to each one by the stakeholders in the basin and bay area that is directly applicable.
Q Do you chair any of these teams?
A Yes, I do. I am chair of the Guadalupe-San Antonio BBEST, or Bay Basin Expert Science Team, and of the Nueces BBEST.
Q And how were you selected to serve as chair of the Guadalupe-San Antonio and Nueces BBESTs?
A I was chosen by a choice of the membership of the BBEST itself.
Q Do you also serve as a member of the Edwards Aquifer Recovery Implementation Program Expert Science Subcommittee?
A Yes, I do.
Q Do you sit on any other committees or boards related to water issues?
A I serve on the Texas Water Conservation Association Environmental Flows Subcommittee and on their reuse subcommittees.
Q And what types of clients have you worked with?
A I’ve worked with a broad spectrum of clients over the

years. I guess I'll start with the big picture. I have worked for many state agencies, the Texas Commission on Environmental Quality, the Texas Water Development Board, the Texas Parks & Wildlife Department and this has been in the role of my employment with HDR and I have also worked with river authorities and other types of water authorities such as the San Antonio River Authority, the Guadalupe-Blanco River Authority, the Edwards Aquifer Authority, the Upper Guadalupe River Authority and then on a little finer scale, I've worked with municipal and industrial clients and steam electric power generators all of whom have water rights, water supply and water-planning issues.

Q Have you written any papers or prepared any technical reports on the subjects of environmental flows, river basin hydrology, water rights, water-supply planning or statistical analyses?

A Yes, I have. Over the course of 29 years in my career, I've prepared probably about a hundred reports. I do not have an exact amount but a hundred reports involving those subject areas.

MS. ROBB: Your Honor, Defendants offer Mr. Vaugh as an expert on environmental flows, river basin hydrology, water rights, water-supply planning and statistical analyses.

MR. IRVINE: No objection, your Honor, as long as it's limited to the scope of his report.

THE COURT: As long as what?

MR. IRVINE: Limited to the scope of his report.

THE COURT: Thank you. That'll be fine.

BY MS. ROBB:

Q Now, Mr. Vaugh, let's talk about the water allocation and permitting system briefly within the Guadalupe-San Antonio River basin. In your experience, how do the permits required for water withdrawals from the Guadalupe and San Antonio Rivers work?

A Well, in the Guadalupe-San Antonio River basin, there are over 600 individual water rights and the aggregate total in terms of consumptive use associated with those water rights under their permits is about 650,000 acre feet per year. Those water rights are managed legally on a prior-appropriation basis, i.e., the first in time is the first in rights so that the older or more senior water rights are entitled to their water before the junior or less senior water rights in times of shortage.

Now, that process is managed or administered through the South Texas Water Master which is a portion -- or is related to the Texas Commission on Environmental Quality. So when the water-right owner wishes to make a diversion, they would advise the Water Master of that intent. The Water Master would acknowledge that and then after the diverter had actually made their diversion, whether it's to irrigate a field or for

their city or their industry, they would report the amount actually diverted to the Water Master and then the operation of each individual water right under the Water Master and their permit is subject to the exact provisions within their certificate of adjudication or permit which in shorthand would be their water right and those water rights will typically include a maximum annual diversion --

MR. IRVINE: Excuse me, your Honor. None of this was discussed in his expert report. I understand he has a lot of background knowledge about water rights in general and he's just kind of laying a foundation but he did not go into specific special conditions or the way various permits operate in his expert report.

THE COURT: Sustained. You were going to withdraw that anyway. Did you have any response? Is that okay?

MS. ROBB: Well, your Honor, we just thought that with Mr. Vaugh's background and given all the discussion that's gone on here through Q&A about different aspects of the system that it might be useful to have him put it together in one place briefly.

THE COURT: I think if he wasn't designated to do that, he's not going to be able to do that.

MS. ROBB: I guess we viewed it as a background to some of the things that he will be talking about that were in his expert report.

THE COURT: Okay, thank you.

BY MS. ROBB:

Q Let's talk about the SB3 process. In the SB3 process, you have chaired two BBESTs and are a member of a third BBEST. What is your understanding of the purpose for the SB3 process?

A My understanding is that the primary purpose is to adopt -- or TCEQ to adopt environmental flow standards for the river basins across the state and in leading to that, you know, to adopt environmental flow standards and then to use those standards in the consideration of future water-rights applications and -- for new water, unappropriated water or amendments to existing water rights.

Q Let's take a look at Defendants' Exhibit 425. Can you briefly summarize how the SB3 process works?

A Certainly. The ultimate objective is shown in blue on the far right-hand side which is the environmental flow standards which will be adopted through ITCEQ through a public rule-making process. Now, how we get up to that point again is in the upper left-hand corner with the orange boxes and the key beginning-point box there is the environmental flows advisory group, or the EFAG for short, which is comprised of three representatives, three Senators and three leaders from each of the key water-resource agencies in Texas, TCEQ, Texas Parks & Wildlife and the Texas Water Development Board.

Now, that group, the EFAG has appointed a Basin and

Bay Area Stakeholder Committee, or a BBASC for short, which is a group of individuals that represent a cross section and spectrum of interest within a given river basin and associated estuary area. The EFAG also appointed for the entire state a Science Advisory Committee, or SAC for short, which is comprised of scientific experts with knowledge in hydrology and biology as it relates to in-stream flows and freshwater inflows to basin estuaries and that Science Advisory Committee provides guidance to the BBEST, which I'll get to in just a moment, and then reviews the work of the BBEST and of the BBASC and reports back to the leadership, the EFAG.

Now, BBEST, the science teams which I have served on -- that's the only part of this chart where I fit in -- is appointed by the stakeholder committee. So the stakeholder committee in each given basin and bay area identifies individuals that they feel -- individual scientists that have knowledge or expertise in hydrology or biology, science of environmental flows, geomorphology and so on to provide recommendations of environmental-flow regimes and the BBEST, their product -- I'm sorry it's just not a short explanation.

The BBEST on the basis of scientific considerations makes the -- makes a recommendation of what they think is necessary to maintain a sound environment within an ecosystem and provides that recommendation to TCEQ directly and back to the stakeholder group, or BBASC. After that point, the BBASC,

the stakeholder group, takes under advisement what is necessary in the mind of the BBEST to protect the environment and balances that with human needs for water, for municipal, industrial water supply, power generation and so on and then the BBASC provides their own recommendations directly to TCEQ and then TCEQ with those two sets of recommendations and then public involvement through a standard public rule-making process ultimately will adopt environmental-flow standards applicable in the Guadalupe-San Antonio River basin and in the Guadalupe Estuary.

I should note and should have noted that in each of those boxes, there's a little clump of people. Every step of the process is indeed a public process.

Q You indicated that you chair the Guadalupe-San Antonio BBEST. Where does the process stand?

A In terms of the BBEST responsibilities, the science team, we delivered our report -- our recommendations report for environmental-flow regimes on March 1st of 2011 and then the BBEST provided technical support to the stakeholders, or BBASC, as they prepared their recommendations report which was submitted September 1st of 2011 and at this point in time, the BBEST continues to serve at the needs of the stakeholder group as they develop their work plan.

Q Did the Guadalupe-San Antonio BBEST make any findings related to the soundness of the Guadalupe Estuary?

A Yes. It was the consensus of the BSA BBEST, for short, that the Guadalupe Estuary was representative of a sound ecological environment.

Q And how did the BBEST consider the environmental flows' needs for the Guadalupe estuary?

A With the approach that --

THE COURT: I'm sorry. Say that again. The BBEST for the Guadalupe-San Antonio River said that the bays and estuaries were sound?

THE WITNESS: They said that the Guadalupe estuary which would include San Antonio Bay, Hynes Bay, Mesquite Bay and so on, all the bay system.

THE COURT: They were sound?

THE WITNESS: Yes, ma'am.

THE COURT: It was okay?

THE WITNESS: Yes.

THE COURT: BBEST said that?

THE WITNESS: Yes.

THE COURT: Okay. Then how come they couldn't reach a consensus on BBASC, the stakeholders?

THE WITNESS: Well, the BBASC -- excuse me. I'll try to answer you directly, your Honor.

THE COURT: That's good.

THE WITNESS: The BBASC can consider a variety of factors. Not only the science and necessarily the health of

the system, they can consider human needs and balancing as well. In fact, that's part of their charge in statute and so how they do that varies by the mind of each member and that is how they, I guess you would say, did not achieve a consensus report. The BBEST did achieve a consensus report.

THE COURT: So BBASC -- what was the disagreement? Were there two positions or multiple positions?

THE WITNESS: Your Honor, from my perspective, there were certainly multiple positions. The BBASC is comprised of, I believe, about 25 individuals that represent interests from one end of the spectrum to the other and one end of the basin to the other and each of those members in considering whether or not to support the recommendations from that group, I could not speak to all the thoughts that were in each individual's mind --

THE COURT: Well, what did you -- you were there, weren't you?

THE WITNESS: Yes, ma'am.

THE COURT: Weren't you part of a committee?

THE WITNESS: No, ma'am. I'm on the BBEST. So I serve in a technical role.

THE COURT: Okay. So BBEST said, everything's fine, don't need any more inflows, everything is okay? Is that what you mean? Is that what they said?

THE WITNESS: The BBEST said that based on historical

conditions up to this time that the estuary today is in a sound ecological system.

THE COURT: So what was there for BBASC to consider?

THE WITNESS: The BBASC by statute and Senate Bill 3 is required to consider other factors in addition to the needs of the environment and that other -- one of the other factors specifically in the law is to consider needs for water and water planning for other uses.

THE COURT: So BBEST said as long as it gets the same inflow that it's gotten historically it's going to be okay?

THE WITNESS: That would -- that's a fair summary of the BBEST recommendation.

THE COURT: So BBASC wanted to take more water away from those estuaries or what's the problem?

THE WITNESS: I would say that some members of the BBASC have an interest to develop additional water supplies to meet customer needs and so they would if they did develop those reduce the freshwater inflows. Other members of the BBASC felt perhaps that the BBEST didn't go far enough in protecting the estuary.

THE COURT: What ones of the BBASC thought that BBEST didn't go far enough in protecting the basin estuaries?

THE WITNESS: Your Honor, that would be truly very difficult for me to reach inside the head of each of those members.

THE COURT: Well, didn't they express opinions? You don't have to reach inside the head to repeat opinions.

THE WITNESS: I think that it would be fair to say that the representatives of the environmental interests on the BBASC.

THE COURT: Who were they? What environmental interests?

THE WITNESS: I believe that the specific -- I would prefer to have a list. That would help but I'll try to do it from memory if you wish.

THE COURT: Okay. Do you have a list?

MS. ROBB: I do not have a list with me.

THE COURT: Okay.

THE WITNESS: I can work from memory up to a point, your Honor.

THE COURT: I know. You're doing better than I am. So just environmental -- like is the Nature Conservancy a member or Audubon Society or --

THE WITNESS: Well, there were --

THE COURT: -- Environmental Defense Fund -- I guess that wouldn't be -- that's a lobbying group. So --

THE WITNESS: Well, there were designated environmental interests. One of those seats was filled by a faculty member at UT Marine Science Institute in Denton. So he was a researcher. His designated interest as I recall was

environmental. Now, he unfortunately missed a number of meetings because of research obligations and he had alternates who sat in for him. I know that there was a representative, I believe, of recreational interests that is employed by the National Wildlife Federation, Ms. Ellis -- Jennifer Ellis. There was a representative from the Sierra Club. Mr. Tyson Broad was a stakeholder committee member. There were -- and these are folks that would have been supportive of the BBASC recommendation as it was submitted -- or at least the majority recommendation.

THE COURT: What was the majority recommendation?

THE WITNESS: In general -- well, that gets down to very specific detail in the sense that recommendations were made for 16 in-stream locations up the Guadalupe River and up the San Antonio River and for the estuary as well and so some members were supportive of part of the recommendations but not necessarily other parts of the recommendations.

THE COURT: That doesn't tell me anything. That's as good as it's going to get? Some did this, some did that?

MS. ROBB: Well, your Honor, his testimony is what he has just stated.

THE WITNESS: Your Honor, I --

THE COURT: That was good.

THE WITNESS: Your Honor, I can offer a bit more and then I --

THE COURT: It's late. Go ahead.

THE WITNESS: Your Honor, I think in a summary note --

THE COURT: Thank you.

THE WITNESS: -- I think those representatives of the environmental community, from my perception, felt that the BBASC majority recommendation was satisfactory. I believe that some of them felt that the BBEST didn't go far enough in its recommendations. On the other end of the spectrum, those on the BBASC who are responsible for water supply were the ones that did not support the BBASC recommendation and there were three of those members and I believe either 21 or 22 that did -- were the majority.

THE COURT: I'm sorry. Three members disagreed with the majority report. Is that what you're saying?

THE WITNESS: They did not sign off on the final report.

THE COURT: Who are the three members?

THE WITNESS: Those three members were --

THE COURT: Are they not here today? Two of them?

THE WITNESS: No, ma'am, they are not.

THE COURT: Who are they?

THE WITNESS: One would be Jerry James of the City of Victoria. One would be James Murphy of the Guadalupe-Blanco River Authority.

THE COURT: Well, that's this, right?

THE WITNESS: James is not here today but GBRA is --

THE COURT: I'm talking about the entities. He didn't represent himself. He represented these entities as a stakeholder.

THE WITNESS: He represented an interest group, yes, ma'am.

THE COURT: Yeah, the -- one of the intervenors here today.

THE WITNESS: The member --

THE COURT: Do you know who you're working for? Who's paying your way today?

THE WITNESS: The Guadalupe-Blanco River Authority is paying my way today.

THE COURT: Okay. They're here today.

THE WITNESS: Yes, ma'am.

THE COURT: And so are you. Okay, who's the third one?

THE WITNESS: The third one is Paul Defonzo of the City of New Braunfels.

THE COURT: Okay. Moving on.

BY MS. ROBB:

Q Mr. Vaugh, based on your review and understanding of the professional codes of conduct for a professional engineer that govern your certification, do you see any conflict of interest

between your position on the Guadalupe-San Antonio BBEST and your retention by GBRA to provide your expert opinion in this proceeding today?

A No.

Q And let's talk a little bit about --

THE COURT: Why is that? You're on there as advocate for the GB -- I've forgotten the acronym now -- GB --

MS. ROBB: GBRA, your Honor.

THE COURT: -- GBRA. Were you on BBEST as an advocate of GBRA?

THE WITNESS: Your Honor, absolutely not.

THE COURT: But you're here today as an advocate for GBRA?

THE WITNESS: I am here as a witness sworn to tell the truth.

THE COURT: Well, you're designated as an expert by GBRA?

THE WITNESS: Yes, ma'am.

THE COURT: Okay. And they're paying you?

THE WITNESS: Yes, ma'am.

THE COURT: So you're their witness.

THE WITNESS: Yes.

THE COURT: You're their expert.

THE WITNESS: Yes.

THE COURT: So you're going to go back and be on

BBEST and consider yourself independent of the GBRA?

THE WITNESS: I serve on the BBEST as an individual. I was appointed as Samuel Vaugh, not as HDR, the company I work for and not as a representative of GBRA or the San Antonio River Authority --

THE COURT: Have you disclosed to the other members of BBEST your financial arrangement with GBRA?

THE WITNESS: Yes. In fact --

THE COURT: Who?

THE WITNESS: Your Honor, in the selection process when we were being nominated for the BBEST, I provided a resume very similar to the one that is before the Court that shows that I have worked over the years in my role with HDR for almost everyone in the basin and they do not all agree with one another and I simply cannot truly advocate one over the other.

THE COURT: Okay.

THE WITNESS: I serve in a technical role.

BY MS. ROBB:

Q Mr. Vaugh, are you familiar with the types and nature of consumptive surface-water uses from the rivers and streams in the Guadalupe-San Antonio River basin?

A Yes, I am.

Q Can you describe some of these uses? Let’s pull up Defendants' Exhibit 242. Are you familiar with this figure?

A Yes, I am.

Q And what does it tell us?
A This figure is a --
THE COURT: What is the number?
MS. ROBB: Defendants' Exhibit 242, your Honor.
THE COURT: Thank you.
THE WITNESS: Yes, I am familiar with this exhibit and what this portrays. The heavy black bars are representative of the consumptive surface-water use in the Guadalupe-San Antonio River basin from 1941 through 2010. This is how it has increased over time as reported to the TCEQ or the Water -- South Texas Water Master. Also superimposed on this graphic and what you would read off the right-hand scale is the winter whooping crane population or the peak population basically as --
THE COURT: The blue line?
THE WITNESS: The blue line, yes.
THE COURT: Okay.
THE WITNESS: And how that has increased over time.
BY MS. ROBB:
Q Did you prepare this graph?
A Yes.
Q And can you describe what the graph demonstrates?
A Yes. This graphic demonstrates simply that water use -- consumptive water use in the basin has increased from near nothing to as much as 270,000 acre-feet a year in year 2006, a

drought year, and has averaged in recent years about 200,000 acre-feet per year and over that same time period, whooping crane population has increased from a very low number to the 2010 max that is shown there.

Q And can you briefly describe the records of recorded consumptive surface-water uses from the rivers and streams in the Guadalupe-San Antonio River basin?

A Yes. Those records since 1990 are maintained by the South Texas Water Master. Prior to that time, they were reported by the diverters to the TCEQ or its predecessor agencies and maintained as records.

THE COURT: Sorry.

Q And is the whooping crane population trajectory on this figure consistent with that in TAP witness Dr. Sass' amended report Figure 1?

A Yes, it is. We were working from the same Fish & Wildlife Service data.

Q And does your population line extend a little further?

A It does include two more years at the right-hand side, 2009 and 2010.

Q And you said you used the Fish & Wildlife Service crane population data reported in preparing this graph?

A Yes, that's correct.

Q Now, is there any other population data that could be used to make this kind of comparison?

A Yes, there is an interpretation of the population data which is mortality and mortality can be used to further explore potential relationships between consumptive use of surface water and whooping crane population.
Q Are you familiar with the graph marked as Defendants' Exhibit 243? Here it is.
A Yes, I am.
Q And did you prepare this graph?
A Yes, I did.
Q And can you describe what this graph shows?
A This graph is a portrayal over the same time period as the previous exhibit from 1941 through 2010 of whooping crane mortality as a percentage of the flock and this is annual whooping crane mortality from one year to the next as a percentage of the entire flock and we can see that that has generally decreased over time from the past to the present. Also superimposed on this graphic is a five-year moving average of the consumptive surface-water use. Basically it is the same consumptive surface-water use shown in the previous graph but averaged over five-year steps just to smooth it out a bit and so that blue line shows the increase again in consumptive surface-water use to a little over 200,000 acre feet a year in recent years.
Q Now, did you perform statistical tests to investigate the relationship between freshwater inflows to the Guadalupe

Estuary and the alleged whooping crane mortality numbers from the Fish & Wildlife Service reports?

A Yes, I did.

Q And upon -- did you assess the potential correlation between the July and December freshwater inflow and the winter crane alleged mortality for the 1988 to 2008 historical period as described by Dr. Sass?

A Yes, I did.

Q And what statistical analysis method did you use to develop your assessment?

A To perform that comparison or that work in parallel to that that Dr. Sass did to understand it and consider it, I applied the Fisher Test of Independence -- the Fisher Independence Test which is the same test that Dr. Sass used.

Q And what conclusion did you reach?

A Well, as it is a statistical test, you must first begin with the null hypothesis and that that freshwater inflows and the annual mortalities or winter mortalities in this particular case are independent and then the result of the Fisher Test --

THE COURT: Why did you start with that?

THE WITNESS: That would be the standard statistical procedure, to assume that they're independent --

THE COURT: Okay.

THE WITNESS: -- and then by the magnitude of a coefficient that's calculated through the Fisher Test, a P

factor, it will tell you if you can reject the hypothesis, that they are independent. So by the --

THE COURT: Got it.

THE WITNESS: -- and the magnitude of that factor tells you the degree of confidence with which you can reject your null hypothesis of independence. And so I applied the same type of test but I did reach a different conclusion than Dr. Sass.

BY MS. ROBB:

Q And what was your conclusion?

A That one could not reject the null hypothesis of independence with 95-percent confidence.

Q And why did you reach a different conclusion than Dr. Sass?

A The reason I reached a different conclusion there is because of the way that the sample data was partitioned and when I say "sample data," what that means is freshwater inflows for the July through December period and the other sample would be the winter mortality --

THE COURT: July through December?

THE WITNESS: Yes, ma'am.

THE COURT: Okay.

THE WITNESS: Yes. The -- your Honor, the procedure that Dr. Sass used and that I used in this initial examination was to consider a July through December period immediately

prior to and slightly overlapping with the arrival of the whooping cranes --

THE COURT: Okay.

THE WITNESS: -- and to compare that to their loss on the refuge.

BY MS. ROBB:

Q So in this first analysis, you used the same months of freshwater inflow data that Dr. Sass used?

A Yes, that's correct.

Q And you used the same winter crane mortality data that Dr. Sass used?

A Yes. Let me back up for just a moment. I did not use exactly the same freshwater inflow numbers as Dr. Sass. I used freshwater inflow estimates I -- that were used by the Guadalupe-San Antonio BBEST and they're very, very similar and there is no consequential difference during that time period between the freshwater inflow numbers that I used and those that Dr. Sass used.

Now, the -- I believe you asked me why did I reach a different conclusion and that speaks to the two samples that are involved, one being the freshwater inflows and the other being the annual mortality -- excuse me -- winter mortalities that are associated with those inflows. Year by year there is a pairing there and so when we perform the Fisher Test, we need to break those samples into equal pieces. So for inflow, for

example, you would identify the median or the value of inflow that half of them -- half the years it was greater and half the years it was less.

Q That's the protocol for the test?

A That is my understanding of the protocol for the test and both Dr. Sass and I broke the inflows in that same way but on the winter mortalities, Dr. Sass did not break those into equal proportions. In fact, he had two thirds in one grouping and one third in the other and that right there is the difference between the conclusion and I believe that it is appropriate in applying the test to have those proportions being equal and when you do that for the same -- essentially the same data, the conclusion that you reach is that you cannot reject the initial null hypothesis assumption of independence at the 95-percent confidence level.

Q Did you go on to assess the potential correlation between July-December freshwater inflow at annual crane mortality instead of winter crane mortality numbers from the Fish & Wildlife reports for the 1988-2008 historical period?

A Yes, I did.

Q And what statistical method did you use to develop that assessment?

A I used the Fisher Test again and also a comparison of the means and by comparison of the means, I'm saying that I took the years that were below the median inflow and calculated the

mean mortality associated with that and the years that had above the median were high freshwater inflow and calculated the mean annual mortality as a percentage of the flock with that and compared those two to see if they were different, again to see if the null hypothesis, that those two means of high inflow, low inflow, high mortality, low mortality -- if they could be rejected with 95-percent confidence. And I found that, again, using that test, the comparison of the means, that I could not reject the hypothesis that July through December inflows and annual mortality were independent.

Q Did you also assess the potential correlation between annual freshwater inflow and annual crane mortality numbers for the 1988-2008 historical period?

A I did.

Q And what statistical analysis method did you use to develop your assessment?

A Again I used the Fisher Test and the comparison of the means for high and low inflow years.

Q And what conclusion did you reach on that scenario?

A That one could not reject the assumption of independence with 95-percent confidence.

Q Did you expand to the timeframe that Dr. Sass used from 1988 to 2008 to 1941 to 2010 and assess the potential correlation between that timeframe, 1941 and 2010, and the -- for the annual crane alleged mortality numbers and -- excuse me

-- assess the potential correlation between that timeframe crane numbers and the annual freshwater inflow?

A Yes. I did a -- I applied a Fisher Test and again the similar test -- or not similar -- the Fisher Test and a comparison of means, or T Test, for the full period of record, from '41 through 2010 and the -- considered the annual mortalities for that same time period.

Q And what conclusion did you reach?

A Again, one could not reject the initial assumption of independence with 95-percent confidence.

Q Mr. Vaugh, in your opinion under either scenario, annual or winter alleged mortalities, is there a statistically significant correlation between consumptive use and the mortality numbers that were used in your scenarios?

A Okay. The comparisons I did in my scenarios were based on freshwater inflow and mortalities, either annual or winter mortalities, and I did not find -- I could not reject the assumption of independence with 95-percent confidence. Now, as consumptive uses are a much smaller portion of the water balance than total freshwater inflow, I would have to say that the -- it's even less likely that consumptive use of water affected whooping crane mortality.

MS. ROBB: Pass the witness.

THE COURT: Thank you.

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CROSS EXAMINATION

BY MR. IRVINE:

Q Good afternoon, Mr. Vaugh, just a couple of things to clear up. Are you avian biologist?

A No, sir.

Q And are you a biologist at all?

A No, sir.

Q Are you an ornithologist?

A No, sir.

Q And you work for a company called "HDR." Is it fair to say that HDR does a lot of work in Texas for GBRA?

A We work for a great number of clients in Texas. GBRA is one of them.

Q And the San Antonio River Authority?

A Yes, sir.

Q And for TCEQ?

A Yes, sir.

THE COURT: To be on BBEST -- I mean, BBASC -- it's called stakeholder, right?

THE WITNESS: I served -- your Honor, I served on the BBEST science team.

THE COURT: BBEST, okay. You weren't on the BBASC?

THE WITNESS: No, ma'am, I was not.

THE COURT: Okay. Go ahead.

//

BY MR. IRVINE:

Q And you were under contract with HDR to work for GBRA as part of this litigation?

A I'm an employee of HDR and HDR has been contracted by GBRA to participate and support in this litigation.

Q And in the billing records you provided me at the end of September, HDR had been paid over a $151,000 for their work in this litigation for you and one other expert witness; is that true?

A I believe so.

Q And --

A It sounds about right and there may be other employees involved other than one other witness but --

Q Okay. And does HDR have other ongoing contracts with either GBRA, San Antonio River Authority or TCEQ at this time on other issues?

A I can say "Yes" to GBRA and San Antonio River Authority. I'm not sure -- I don't personally have any ongoing contracts with TCEQ at this time. Within the company, I can't say for sure.

Q Okay. And you today are not offering any opinions or testimony with respect to the report of Dr. Katherine Ensor, an expert witness for the Aransas Project?

A No, I am not.

Q Did you review her report?

A I have read her report.
Q And you did not try and rerun her statistical analysis at all?
A No, sir, I did not.
Q Okay. Now, at your deposition we discussed a book that it turned out we were both reading at exactly the same time. Can you tell the Court what book that was?
A *Freakonomics*.
Q *Freakonomics* by Steven Levitt. Do you recall what the subtitle of that book was?
A I do not.
Q It's -- if I were to refresh your memory, it's *A Rogue Economist Explores the Hidden Side of Everything*. Would you agree with me that the central premise of that book is exploring large sets of data and finding relationships within those sets of data?
A Yes.
Q And often these relationships are not readily apparently on the surface of the data?
A That is discussed in the book and it is interesting, yes.
Q And the author goes into the data and investigates what's really going on and then uses statistics to try and provide some sort of answer to the questions he wanted?
A That's my understanding from reading it, yes, sir.
Q Okay. Well, let's just go through some of the statistical

analyses that you did perform in your report. I just want to make clear one thing. Dr. Sass and Dr. Ensor looked at July through December inflows each year in acre feet; is that correct?

A Yes.

Q And Dr. Sass and Dr. Ensor's analyses were also based on winter mortality as a percentage of the flock; is that correct?

A Let me back up here just a moment. Certainly I know what Dr. Sass did. I wouldn't say that I'm familiar enough with what Dr. Ensor did to know exactly the data that she used.

Q But you would agree with me that Dr. Sass looked at those two parameters?

A Yes, sir, July through December inflow and winter mortalities.

Q And did you look at any of Dr. Sass' underlying supporting materials, namely spreadsheets and data analyses that he provided to counsel for GBRA?

A I'm sorry, Mr. Irvine. I'm moving back from you for a moment, if you'll forgive me. Dr. Sass looked at mortality as a percentage of the flock, not as just mortalities, as I've said. So that was an oversimplification and if you would bear with me, could you repeat the next question?

Q The next question was --

THE COURT: Well, the last question was, did you look at any of his data or spreadsheets of Dr. Sass when you came up

with your own findings?

THE WITNESS: Your Honor, I looked at Dr. Sass' report.

THE COURT: Did you look at his underlying data?

THE WITNESS: I looked at his underlying data but I had done most of my work before I actually had his spreadsheets.

THE COURT: So you didn't use his spreadsheet in coming up with your information?

THE WITNESS: No, ma'am, I did not use Dr. Sass' spreadsheets.

THE COURT: Okay.

BY MR. IRVINE:

Q And in Dr. Sass' underlying spreadsheets, did you come across his calculations where he also looked at other periods of inflows and ran Fisher Exact Tests against the mortality data?

A Yes, sir, I did.

Q And can you imagine why perhaps he didn't present that in his final expert report?

A It's Dr. Sass' report and his choices are his choices. I don't know.

Q I mean, he did discuss it. He said, I investigated the annual inflow data and I did not find any significant relationship.

A I don't recall that specifically.
Q Okay. Let's talk about what you did do for your statistical tests. You reran Dr. Sass' analysis using July to December inflows and winter mortality as a percentage of the flock?
A Yes, sir, that's correct.
Q And you redid the same Fisher Exact Test and what was the result?
A The result that I found was one that one could not reject the assumption of independence with greater than 95-percent confidence.
Q Well, I'm talking about the exact test that Dr. Sass ran using his split points on the data. You did perform that analysis to check Dr. Sass' calculations?
A Yes, sir. That's correct and I did get the same answer.
Q And you got the same answer as Dr. Sass?
A Yes, sir, that is correct.
Q So you were able to reject the null hypothesis just as he testified?
A Using --

THE COURT: I don't understand the question. Do you?

THE WITNESS: Not exactly.

THE COURT: Would you go over that again, please?

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BY MR. IRVINE:

Q I'm just trying to clarify that Mr. Vaugh did run these same tests that Dr. Sass ran using the same data set and the same parameters --

THE COURT: And you got the same answer.

MR. IRVINE: And he got the same answer.

THE COURT: Okay. Isn't that what you said?

THE WITNESS: Yes. Using the split points in the winter mortality that Dr. Sass used, I got the same answer that he did.

THE COURT: Good.

BY MR. IRVINE:

Q Okay. And then you performed a number of different statistical tests where instead of looking at July to December inflows, you looked at annual inflows?

A I did perform tests using July through December and then additional tests looking at annual, yes, sir.

Q Okay. And we'll get to those later and then you performed another series of tests where instead of looking at winter mortality, you looked at annual mortality; is that correct?

A Yes, sir.

Q Annual mortality in the whooping crane flock over the winter and the summer?

A Correct, calculated from peak to peak.

Q And what was your basis for deciding that annual mortality

might be a better way of looking at the data?
A Well, my understanding from interaction over the last ten years with folks who study whooping cranes is that the health of the bird is a year-round process and their health on the wintering grounds affects their migration which can affect their nesting success which can affect their migration and ultimately get them back to the wintering grounds. So I view the health of the crane as a year-round process and the mortalities can be affected. I mean, the --
Q In your expert report, did you not write that the basis for choosing animal mortality was that the winter mortality was based on missing or nondetected birds and therefore not reliable?
A I'd have to look at my report to review those exact words but I would agree that the estimate of winter mortality from my perspective -- and I am not an expert on this --
Q Just what I was getting to but --
A -- is -- go ahead.
Q And how did you base your opinion that the data of the winter flock mortality was not reliable?
A The basis for that from my perspective is that the winter mortality is very reliant on the April count which is at a time when the birds are leaving.
THE COURT: Well, what do you mean by any of this?
THE WITNESS: Pardon me?

THE COURT: You're not an ornithologist or a naturalist or a biologist. So why would you presume to take any position about that? Somebody told you to?

THE WITNESS: That --

THE COURT: That was your job?

THE WITNESS: Your Honor, that was based on my experience over ten years.

THE COURT: Was that your directive?

THE WITNESS: No, ma'am, that was not my directive. I operated independently in making that --

THE COURT: Have you ever come up with statistics about bird mortality before and how to use it in any of your engineering jobs?

THE WITNESS: No, your Honor, I have not.

THE COURT: Okay. I think we better not talk about that.

MR. IRVINE: Okay, your Honor.

BY MR. IRVINE:

Q In some of your tests, your ultimate tests, you looked at mortality and inflow data going back to 1941?

A Yes, sir.

Q Whereas Dr. Sass only looked at it going back to 1988?

A Yes, sir.

Q And as part of your tests, you decided that Dr. Sass' choice of splitting high-mortality years and low-mortality

years was wrong?
A Yes, sir, I did. From my research and looking at how to apply the Fisher Test, I found that it is recommended that you have a balanced or an unbiased break in the data point and so I chose to do that.
Q Are you accusing Dr. Sass of choosing a biased break in the data point?
A No, sir, not at all. I believe that Dr. Sass saw an obvious break point in the data. There was a significant gap in the percentage mortalities.
Q Do you recall what that gap was?
A I believe it -- speaking off the top of my head without reviewing it, I believe it was between -- no, I'm not going to speak but I will say it was an obvious break point.
Q Would it be perhaps that anything lower than 1.1 percent winter mortality was low mortality and anything higher than 2.7 percent was high mortality?
A Thank you for reminding me. Yes, sir, that's correct.
Q And that was the split point that he chose --
A Yes.
Q -- based on his analysis? And have you reviewed any documents in which Mr. Tom Stehn has described high versus low winter mortality in terms of percentage?
A No, sir, I have not.
Q So you did not review the comments of Mr. Tom Stehn on the

SAGES report where he --

THE COURT: Okay. I don't see any need to go any further with this.

MR. IRVINE: Okay.

THE COURT: I mean, I'm not going to qualify him as an expert on how to pick crane mortality and apply it statistically, period, which I think is this whole point.

MR. IRVINE: Thank you, your Honor.

BY MR. IRVINE:

Q You had some other opinions --

THE COURT: Everybody knows how you can use numbers to do all kinds of things --

MR. IRVINE: Thank you, your Honor.

THE COURT: -- but you have to have the underlying data correctly or some proper methodology for applying it and he's not qualified to do that on crane mortality.

MR. IRVINE: Thank you, your Honor.

BY MR. IRVINE:

Q You expressed some opinions on SP3 and the SP3 process and the report produced under your guidance as the chair -- chairman of the Guadalupe-San Antonio BBEST?

A I wouldn't refer to my role in the BBEST as guidance. We operate on the BBEST as independent scientists under our professional judgment and we consider guidance provided by the statewide Science Advisory Committee but we are not bound to

that guidance. So I administratively led the BBEST.
Q And you opined that the San Antonio Bay is ecologically sound?
A That was the consensus opinion of the GSA BBEST, yes, sir.
Q And as part of that report, did you study in any way the whooping crane as part of the estuary system?
A Not directly. The approach that we took as a BBEST was to look at indicator species and to use those indicator species which had known salinity preferences which could be related to freshwater inflow.
THE COURT: Okay. Was whooping crane one of the species?
THE WITNESS: No, ma'am.
THE COURT: Was blue crab one of the species?
THE WITNESS: No, ma'am, though we tried very hard --
THE COURT: Okay.
THE WITNESS: -- to make blue crab one of them.
THE COURT: Sorry?
THE WITNESS: Your Honor, there was a great deal of --
THE COURT: Blue crab was not a selected species and whooping crane was not a selected species?
THE WITNESS: That is correct, your Honor.
THE COURT: But what do you mean you tried hard about the blue crab? What did you do for it?

THE WITNESS: Yes. The estuary subcommittee --

THE COURT: You were a breeder for the blue crab?

THE WITNESS: I like blue crabs.

THE COURT: Okay.

THE WITNESS: The estuary subcommittee of the BBEST, knowing the keen interest that many folks have in the blue crab and the abundance of blue crab -- we wanted to make that an indicator species and in fact the estuary subcommittee, which was chaired by Dr. Warren Pulich, invited experts from outside the area to provide insights on the use of blue crab and its preferences for salinity and its habits with -- under the influences of changing salinity as it changed with freshwater inflow and those experts advised them that that would be a very difficult connection to make and so it was the recommendation of the estuary subcommittee that we not rely on blue crab as an indicator species and the BBEST as a whole did not use it as an indicator species but that is how we tried. We sought outside experts from around the country.

THE COURT: Who were the experts that said it wasn't -- it shouldn't be indicator species? Do you remember? Were you on that subcommittee?

THE WITNESS: No --

THE COURT: Okay.

THE WITNESS: -- I was not on that subcommittee.

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BY MR. IRVINE:

Q And you were also involved in the Nueces Bay BBEST; is that correct?

A Yes, sir.

Q And isn't it true that in the Nueces Bay BBEST, you selected five focus species for your analysis?

A That is correct.

Q And the environmental flow recommendation that came out of the BBEST report was tailored to those five species?

A Yes, sir, that's correct.

Q And was one of those species not the blue crab?

A Yes.

Q And --

THE COURT: How come?

THE WITNESS: In the Nueces BBEST, the researchers that were involved were familiar with a technique called "boost and regression trees" and they applied that technique in an effort to assess the salinity preferences for blue crab and felt that that could then be related to freshwater inflow.

THE COURT: How come it wouldn't be the same for the other bay? I thought you-all had just had a witness up here telling me that it's all one big thing from -- was it Copano, the far south, Nueces? I forget. Anyway, Nueces up to Matagorda.

THE WITNESS: Well, your Honor, the booster

regression trees are based on the available sample data in each estuary and it, as I understand it, tries to seek relationships between the sampling from 1977 through 2010 by the Texas Parks & Wildlife --

THE COURT: Was this litigation already under way with the BBEST when the BBEST met on the Guadalupe and San Antonio Bay and estuaries?

THE WITNESS: This litigation, it was --

MR. IRVINE: Sort of concurrently, I think.

THE WITNESS: I would agree with that, yes.

BY MR. IRVINE:

Q The BBEST for the Guadalupe-San Antonio Bay completed their report March 1st of this year; is that correct?

A That's correct and the Nueces BBEST submitted its recommendations report on October 28th.

Q And you worked roughly for a year on the Guadalupe-San Antonio BBEST report?

A Yes, sir.

Q Okay. And with the Nueces Bay BBEST report, did you not conclude that based on those five focal species, which included the blue crab, you recommended a preferred salinity level in the Nueces Bay of 18 parts per thousand; is that correct? I know the recommendation is more complex than that but that was one of your recommendations in the Nueces Bay BBEST.

A Well, I think I probably do need to touch on a bit of the

complexity to be fully responsive to that. In the Nueces system, there's Corpus Christi Bay, the estuary at large and there is Nueces Bay which is not separated but is the portion of the bay, overall estuarine system closest to the river and so there, yes, we focused on 18 parts per thousand in the Nueces Bay, not Corpus Christi Bay, as being a target number based on the preferences of five species, really focusing more on four species, the Spartina alterniflora which is a plant and then on Benthic infauna which is things that crawl around on the bottom, oysters not so much and then Atlantic croaker and blue crab.

THE COURT: Okay.

BY MR. IRVINE:

Q And was there any attempt in the Guadalupe-San Antonio system to come up with a preferred salinity-range figure?

A In the Guadalupe-San Antonio?

Q Yeah.

A Absolutely. That was -- a salinity-zone approach was the approach used by the GSA BBEST.

Q Just not for blue crab?

A Just not for blue crab.

Q Okay. I have one more -- a couple more questions related to your prior testimony on the relationship between consumption of water and whooping crane population numbers on mortality. You're not seriously suggesting that there is a correlation or

relationship between more water consumed and more whooping cranes, are you?

A No, sir. I'm just observing that that is what has occurred.

Q Okay. And you're not seriously suggesting that more water consumption lowers whooping crane winter mortality, are you?

A I have not explored that.

Q And isn't it true that those graphs you showed up there only reflect water consumption and nothing in those graphs indicated how much water was actually flowing into the bay during those years? Is that correct?

A That's correct, yes, sir.

MR. IRVINE: Okay. I pass the witness, your Honor.

THE COURT: Thank you. Anything further?

MS. ROBB: No further questions.

THE COURT: Thank you, sir. You may stand down. Call your next witness.

(Witness stepped down)

MR. TAYLOR: Your Honor, Defendants call Dr. Thomas Miller.

THOMAS MILLER, DEFENDANTS' WITNESS, SWORN

THE COURT: Somebody is clicking their pen. Sanction yourself somehow. You're going to have to buy all those people drinks.

MR. BLACKBURN: That's going to be a heavy load.

THE COURT: I know. Go ahead.

MR. TAYLOR: Thank you, your Honor.

DIRECT EXAMINATION

BY MR. TAYLOR:

Q Dr. Miller, will you please introduce yourself to the Court?

A My name is Thomas James Miller.

Q Your accent is a little different than some of the other experts and witnesses we've had sitting in that box. Can you please tell us where you're from?

A Originally from London in the United Kingdom.

Q And where do you currently live?

A I live in a town called Solomons, Maryland which is about 50 miles southeast of Washington, D.C. on the western shore of the Chesapeake Bay.

Q Why don't we take a look at Defendants' Exhibit 257? Is Defendants' Exhibit 257 a copy of your CV?

A Yes, it is.

Q Why don't we blow up and look at education and does Defense Exhibit 257 accurately set forth your education?

A Yes, it does.

Q Can you please briefly describe your educational background?

A I did undergraduate work at the University of York in the United Kingdom with a degree in human and environmental biology

which I received in 1981. I came to the United States in 1982 and I did a master's degree at North Carolina State University in ecology which I completed in 1984. I went back to the United Kingdom for a period of about 12 months and then I came back to North Carolina in 1986 and I completed by PhD at North Carolina State in 1990 in zoology.

Q Let's talk a little bit about your work history. Down at the bottom and highlighted is a time period from '84 to 1986. It says you were a secondary school teacher in London. Is that the equivalent of middle school here in the U.S.?

A It's the equivalent of a combined middle and high school. It's children from 11 to 18.

Q And what subject did -- subjects did you teach?

A I taught biology, physics and math and chemistry.

Q And when did you start teaching at the university level?

A I was a teaching assistant throughout my master's and PhD studies which meant I taught labs but then I taught -- I was the sole instructor for courses when I started at the University of Maryland in 1994.

Q And just briefly, throughout your teaching career, can you give us an idea of what types of classes you taught?

A I have responsibility for two main courses. One considers the ecology of exploited species -- exploited aquatic species. That would be species that are fished. So it would include both thin fish and shell fish and then I also teach a course on

the dynamics of those species.
Q And is a complete list of all the classes that you've taught contained on Page 22 of your CV?
A I believe it is, yes.
Q Okay. What is your current position today?
A Currently I'm the director of Chesapeake Biological Lab and I'm a professor at the Chesapeake Biological Lab.
Q And as a director the lab, what is your role? What are your duties?
A In addition to my research and teaching responsibilities that I have as a professor, I also am in charge of administration of the lab. I'm effectively the chief academic officer at the lab.
Q Now, let's look at Page 2 of your CV and I want to focus on the part that talks about your areas of professional expertise, your research. We see here that it says that one area of your expertise is blue crab ecology and exploitation, population dynamics and stock assessment. Can you tell us what that means?
A The first part is that I study the ecology of blue crab in its natural environment and in particular I focus on the impacts of commercial and recreational harvests of blue crab in its natural environment. The second phrase after the semicolon, population dynamics and stock assessment is the field of study that uses statistical and mathematical modeling

of data to try and draw inferences about patterns of abundance in the past and to make forecasts about patterns of abundance in the future.

Q When did you first begin performing research or focusing research on blue crabs?

A When I moved to Maryland in 1994. Blue crab is sort of emblematic of the Chesapeake Bay. It's very hard to be there as a researcher with interests in fisheries and not be interested in the blue crab.

Q All right. A little further down below the research, we see a list or the beginning of a list of your publications. Does your --

THE COURT: Do you eat blue crab?

THE WITNESS: Do I eat blue crab? I must admit I don't very often. I feel a --

THE COURT: Well, I'm just curious because I --

THE WITNESS: -- conflict of interest --

THE COURT: I know.

THE WITNESS: -- between studying them and eating them.

THE COURT: I was thinking about Sylvia Earle when I met her and she said, you know, I swim with the fish. I don't eat the fish. I just --

THE WITNESS: Yeah, I feel much the same way, your Honor.

THE COURT: Okay.

BY MR. TAYLOR:

Q Does your CV describe your publications?

A Yes, it does.

Q Under peer-review publications, I looked kind of through and I saw -- I think I counted 19 peer-review publications or reports that you've authored concerning blue crabs. Is that a fair number?

A I believe it is, yes, sir.

Q All right. Let's look at Page 7 of your CV and up at the top, we see technical reports. Have you also -- and these include the technical reports that are peer-reviewed that you've authored or worked on concerning blue crabs?

A Yes, and I divide them into two -- the technical reports into two areas, one a peer-review technical reports. These are reports that I've completed for funding agencies such as the National Oceanic Atmospheric Administration that under their request undergo a rigorous in-person international review. So they bring scientists expert on the assessment of crab fisheries around the world. They bring them into Maryland and we spend a week going through the analyses with a fine-tooth comb to ensure that they provide a sound, scientific basis for the management of crab resources.

Q What other bodies or agencies have you performed research reports for?

A In addition to the National Oceanic and Atmospheric Administration, I've performed work for the Maryland Department of Natural Resources, the Virginia Marine Resources Commission, for the Mid-Atlantic Fisheries Management Council and the Atlantic States Marine Fisheries Commission.

Q Below the peer-reviewed technical reports, there's a listing of your nonreviewed technical reports. Do a number of those relate to your work in the area of blue crabs?

A They do. For every research funding award you have from national, regional and local agencies, they normally all require a written report that summarizes the findings of your research and these nonreviewed technical reports contain those final project reports.

Q Have you given speeches and presentations concerning blue crabs?

A Yes, I have.

Q Can you -- approximately how may have you given?

A I would imagine more than 50. They range from presentations at scientific meetings where I'm talking to my scientific peers. They remain -- they include presentations to commercial fishermen. It's a very important part of conducting assessments in that you try to explain the findings and the consequences of your research to the people who those findings impact directly and then I was a very firm believer in that it is my responsibility as someone paid by a state to communicate

the findings of my research to the citizens of that state.
Q Let's take a look at Page 23 of your CV. Does this list some of the grad students that you've supervised in your academic career?
A Yes, it does.
Q And a number of those focus their research on blue crabs?
A Yes. Yes, the three that you've highlighted and in fact I think since I provided you with a resume, one more has completed their work this September on blue crab as well.
Q Okay.

MR. TAYLOR: Your Honor, at this time, the Defendants offer Dr. Miller as an expert in blue crab ecology, exploitation and population.

THE COURT: Any objection?

MR. BLACKBURN: No objection as long as the scope's limited to the expert report.

THE COURT: Okay. That's accepted.

BY MR. TAYLOR:

Q Dr. Miller, let's talk a little bit about the blue crab life cycle, okay? Let's look at Defendants' Exhibit 259. If we can make that a little bigger -- perfect. Is this a diagram of the blue crab life cycle that you included in your report in this case?
A Yes, it is.
Q Can you use this diagram to briefly explain the blue crab

life cycle?

A Certainly. I'm going to start at what would be the 9:00 o'clock position on this circle where we see egg-bearing females. The female there is carrying an egg mass on her abdomen. That's the orange shape on her abdomen. She migrates down to high-salinity waters. It is essential that she releases the larvae into high-salinity waters. They require salinities of 20 and greater and it -- for successful development and in most cases the females will walk all the way to the mouths of estuaries to ensure that their larvae get out into the coastal ocean.

She will release somewhere between 2 to 5 million offspring every time she has a clutch of eggs and the first larval stage are called "zoea." These are less than a millimeter in size. They go out into the coastal ocean. They are no longer in the estuary. They are in full-strength sea water with salinities of 32 and higher. They remain in the coastal ocean for the period of a month or two. They undergo one molt to the next larval stage which is called a "megalopa" which looks a little bit like a very, very small lobster. It's the first stage that has claws that you would recognize as a crustacean. These megalopae are the stages that reenter the coastal estuaries and as they do, they undergo one last metamorphosis to become the first juvenile crab stage which are about the width of your little fingernail at most.

They then grow and disperse through the estuaries molting probably 20 more times until the males and females mature. The male will cradle the female as she goes through a last molt and while she's in a soft state between molts, transfers packages of sperm to the female. That's the only time she molts and from that single molting, she can produce multiple broods of eggs. If we go from the 9:00 o'clock position all the way around back to the 9:00 o'clock position, it can take, depending on where we are in the crab's range, anywhere from 10 to 18 months.

Q And I wanted to back up. You mentioned that females, they couple one time in their life?

A Yes.

Q And then what happens after they release their eggs -- the eggs?

A So the females that have released their eggs in the mouths of the estuaries will go back inside the estuary for a short while and then move back out as -- once they've developed their second brood of eggs. Most recent evidence from North Carolina and from Florida suggests that they can have three or more broods in a year.

THE COURT: I thought you said they only mate once?

THE WITNESS: They only mate once, your Honor, yes, but they carry enough sperm --

THE COURT: Okay. To fertilize future --

THE WITNESS: Multiple broods.

THE COURT: Got it.

THE WITNESS: Yes.

THE COURT: That's fascinating.

THE WITNESS: It's part of the reason why I've continued working with them. They are a fascinating organism and we don't fully understand how they maintain -- whether they maintain the sperm or whether the sperm fertilize the eggs and they maintain the eggs in an arrested stage. There's some uncertainty still over that.

BY MR. TAYLOR:

Q Now, what is the size -- let's see. The juvenile crab's up there. What is the size of the juvenile crab?

A When they first appear in the estuaries after they -- after the megalopae has gone through its last transformation, they are probably about 5 millimeters carapace width. We measure crabs from one spine across their back to the other. So they are on the order of a quarter of an inch in size and remain juveniles until some of them begin to mature as adults perhaps as small as 17 millimeters carapace width, so perhaps 3 inches carapace width and they will all have fully matured by the time they are a hundred and twenty millimeters carapace width or about 5 inches.

Q Do blue crabs need high salinities to ensure population growth?

A High -- access to high salinity is essential for population growth because of the requirement for 20 parts and higher salinity of the zoea and they, in fact, do better at higher salinities than that. If blue crabs do not have access to that high salinity, they cannot complete their life cycle.

THE COURT: So consequently they also need low salinity?

THE WITNESS: No, your Honor. They can --

THE COURT: Why do they come back for low salinity then?

THE WITNESS: They can, indeed, complete their entire life cycle in the ocean and there are local stocks of crabs that never go into an estuary. It is the estuary-dependent stocks that require the high salinity. They then come back to the low salinity because it offers in many cases increased access to food, for example.

THE COURT: Okay. So they do -- those crabs, however, need the low salinity for their food cycle?

THE WITNESS: Don't need it, no. There's no --

THE COURT: Why do they keep coming back then?

THE WITNESS: Because the food resources in those environments are improved. There's no physiological need for low salinity in the same way that there is a physiological need for high salinity for the zoea to develop.

THE COURT: So I guess if the environment becomes bad

for the food source, they just stay out in the salinity and don't come back in?

THE WITNESS: That could occur, yes.

THE COURT: I'm just trying to --

THE WITNESS: It could occur. It's hard for me to envisage that an estuary could become that degraded that they would never come back but it is certainly a possibility, yes, and they would do very well in the marine environment. There is no physiological need for the low-salinity conditions.

THE COURT: But they go there because of the food source?

THE WITNESS: Yes. Yes, your Honor.

THE COURT: And if the food source is no good, they could go someplace else?

THE WITNESS: They could go somewhere else, yes, your Honor.

THE COURT: Okay.

BY MR. TAYLOR:

Q Let me ask you a question about that. What do blue crabs eat?

A Blue crabs eat a very wide diet. They -- as you can imagine with their powerful claws, they are very good at crushing clams and other bivalve mollusks. They are also scavengers. They will eat dead animals. They will catch small fish. They are very well-known to nip the siphons off of

clams. Clams, as you may know, bury deep in the sediment and they push a feeding siphon up into the water column and crabs are very good at almost mowing the grass as they walk along and clipping the siphons off clams.

THE COURT: Does that kill the clam?

THE WITNESS: No, it doesn't, your Honor. The --

THE COURT: Will it regrow?

THE WITNESS: -- the siphon will regrow, yes. I'm sure the clam doesn't enjoy but it's not a fatal injury. Importantly for blue crabs, one of the other major prey items are other blue crabs. They are a highly carnivorous species.

BY MR. TAYLOR:

Q And so blue crabs can eat other blue crabs?

A Yes, and do so frequently.

THE COURT: What would make them do that? I mean, is that -- do they not discriminate among their own species?

THE WITNESS: I don't think they have the moral code that --

THE COURT: They don't?

THE WITNESS: -- you and I have, your Honor.

THE COURT: Are there times when they prefer to eat each other more than they prefer to eat something else or is it just all --

THE WITNESS: As I mentioned, they grow by molting and as you can imagine, these are animals that are built in the

reverse way that we are. We have our skeletons on the inside and our muscles can always work against our bones.

THE COURT: So they're more vulnerable when they have their soft shells?

THE WITNESS: When they're soft shelled, they can't move. They're like a limp rag on the floor and under those conditions, they are very, very vulnerable to other crab predators, yes.

THE COURT: Thank you.

BY MR. TAYLOR:

Q I want to take a step back. Have you studied crabs in a diverse or wide range of estuarine systems?

A I've studied crabs from estuaries in Connecticut all the way down the East Coast into the Gulf coast of Florida and in the last three years I've also studied crabs in Mediterranean where they have become established as an exotic species. They were transferred there through ballast water and they are becoming quite a nuisance there on the native clams and mussels.

Q Is there any physiological difference between blue crabs either on the -- all along the Atlantic coast or in the Mediterranean and blue crabs on the Texas coast?

A Not as far as I'm aware, no.

THE COURT: Have you studied that?

THE WITNESS: Have I studied -- personally, no. I've

reviewed the literature and there's no evidence in the literature of anywhere within the range of blue crabs. The whole species naturally ranges from Argentina all the way up to Nova Scotia and Canada and there's no evidence of local --

THE COURT: Differentiation of any kind?

THE WITNESS: -- differentiation.

THE COURT: Feeding habits or anything else?

THE WITNESS: No, your Honor, no.

BY MR. TAYLOR:

Q Let me ask a couple of follow-up questions. Are there any unique factors that affect the abundance of blue crabs in Texas?

A Not that I'm aware. They would be -- their abundancies would be driven by the same fundamental processes that they are in different places. The relative importance of the processes may different -- differ but the processes themselves will be the same.

Q And have you studied the role of salinity in the blue crab life cycle and population dynamics?

A It's been one of the key factors that we've looked at in trying to understand the growth dynamics between the juvenile stage when they first enter the estuaries and when they mature to the adult stage and that's important to understand fisheries. It's a critical issue of fisheries and so we've been very careful about that work.

Q Is there anything unique about the effect of salinity on blue crabs in Texas versus elsewhere?
A Not that I'm aware. Again, physiologically they appear one well-mixed species from Argentina up to Nova Scotia.
Q So crabs are crabs and salt is salt?
A Very much so, yes.
Q Okay.

THE COURT: Do you study other crabs or just the blue crabs?

THE WITNESS: I have studied other crabs as well. There's several species of crabs that have occurred in the Mid-Atlantic. In the same way that blue crabs have become established in European waters through ballast waters, there are several European crabs that have become -- and Asian crabs that have become established on the East Coast that are causing difficulty in the ecosystem. There's an Asian crab called a "Mitten" crab, so named because it has hairs all over its claws. It almost looks like it's wearing a pair of mittens and that buries in the sediments and it disrupts marshlands. European Shore crab has become established and there are concerns over the competition between European Shore crabs and blue crabs because it's such an important species -- blue crab is such an important commercial species.

THE COURT: Okay. I just read where Maine was trying to promote this crab called the -- they call it "Pinky Toe"

crab. That's not -- that is not a species of blue crab at all, is it?

THE WITNESS: No. No, no. There's -- fisheries in general are having such a hard time --

THE COURT: That they'll do anything.

THE WITNESS: -- that anything that they can do to make a living and I fully understand the pressures that they're under.

THE COURT: I do too. It's bad.

THE WITNESS: It's a tough life.

THE COURT: Sorry.

BY MR. TAYLOR:

Q Let's talk about the impact --

THE COURT: Just curious.

MR. TAYLOR: Oh, sure, absolutely.

BY MR. TAYLOR:

Q Let's talk about the impact of salinity on blue crabs. Can crabs live in a wide range of salinities?

A Crabs are very -- blue crabs are very well-known for the range of salinities that they can live in from fresh -- almost fresh water, which would be a salinity of almost zero, to as I've said in answer to the judge's questions, they will live out in oceanic water, salinities of 32 to 35. They are also known to live in hypersaline lagoons and hypersaline in this case means salinities over and above seawater concentrations

and the literature reports records of them living in salinities of up to a hundred and seventeen. So we're talking four times seawater strength.

Q Were you in the courtroom --

THE COURT: Do they live long or --

THE WITNESS: Yes, they are sustainable. It's not that you can put them in a hundred and seventeen and they survive. These are --

THE COURT: Adapt?

THE WITNESS: -- these are -- yes, your Honor, sustainable crab populations that grow, breed, reproduce successfully, produce more crabs, yes.

THE COURT: I guess I'm trying to get my pitiful mind around that they can adapt to a hundred and seventeen.

THE WITNESS: Yes.

THE COURT: They can adapt to a low salinity.

THE WITNESS: Yes.

THE COURT: Are there groups that just like to have low salinity and don't have to do any different adaptive behavior? They -- like these, they go out and lay the eggs in the high salinity and come back into the low salinity.

THE WITNESS: For some species of estuarine animals, we do know that there are some individuals that choose a resident life history and some that choose to go in and out of the estuary. We've never done those studies on blue crab to

ask whether there are components of the blue crab in --

THE COURT: Like families that --

THE WITNESS: -- families or --

THE COURT: -- say, we would like to vacation here in the low salinity?

THE WITNESS: We haven't done that research.

THE COURT: Okay. So it's possible that that's what we have here?

THE WITNESS: It's not impossible but --

THE COURT: I wouldn't say --

THE WITNESS: No.

THE COURT: -- a reasonable probability --

THE WITNESS: Right.

THE COURT: -- but I'm just saying it's --

THE WITNESS: It's not impossible.

THE COURT: Okay. I just can't figure it out otherwise --

THE WITNESS: What --

THE COURT: -- that they keep coming back.

THE WITNESS: Why they keep coming back to these environments? Estuaries provide certain characteristics that make them attractive to lots of species. They are important nursery areas because estuarine waters tend to be shallow and warm. So they produce large volumes of food.

THE COURT: Of food.

THE COURT: They're very, very productive. Because they are a gradient between fresh water and salt water, there aren't many species that can live in that highly variable environment and so there tend to be fewer predators in estuaries than there are in the ocean. So it's believed that animals use estuaries as nurseries because of the high productivity and the low mortality rates.

THE COURT: Well, then it just seems to me if the estuary suddenly became very highly salinic -- or high in saline that it wouldn't have that kind of life support anymore.

THE WITNESS: If salinity -- if estuaries became the same as the coastal ocean --

THE COURT: As oceans.

THE WITNESS: -- but it would still have the shallowness that would I think promote the blooms of algae in the springtime. It's the shallowness that allows the algae to bloom in vast numbers and it's that that drives the productivity in estuaries. So I think if we imagine --

THE COURT: Not like red tide?

THE WITNESS: Well, algae like -- I mean, red tide are an algae --

THE COURT: Yes.

THE WITNESS: -- but it's green algae that we're talking about here.

THE COURT: Gangrenous. No, you weren't here. Never

mind.

THE WITNESS: So I think if we did the hypothetical experiment of saying the estuary is now full-strength seawater, there would still be some attractions to be in an estuary though it would only be the shape of the estuary. It wouldn't be the -- what we understand as the salinity gradient in an estuary.

THE COURT: Okay. Thank you.

BY MR. TAYLOR:

Q Did you hear the testimony from Dr. Ward that in his opinion, diversion -- water diversions in 2008-2009 affected salinity at most between one to two parts per thousand?

A I was in the courtroom for that, yes.

Q In your opinion, would a change or a salinity increase of one to two parts per thousand impact blue crabs?

A I believe it would be an immaterial change.

Q Do blue crabs have a salinity preference?

A Not to the extent that if you gave animals a choice that they would choose one salinity over the other, no.

Q Okay. Let's look at Plaintiff's Exhibit 68 and this is a figure that Dr. Montagna used in his testimony. I first want to ask you, is there a salinity level that's known to exist historically in the Guadalupe Estuary that would force blue crabs to leave the marshes?

A No. No, as I said, they are --

MR. BLACKBURN: Your Honor, excuse me. The expert report offered no information specific to San Antonio Bay and, I mean, I think you're just asking a question about that. There was no information specific to San Antonio Bay that I'm aware of.

MR. TAYLOR: He talked -- in his --

THE COURT: Is it in the report?

MR. TAYLOR: In his report, he talked about the role of salinity and whether or not it impacted distribution and --

THE COURT: Does he know anything about San Antonio Bay?

MR. TAYLOR: No, he's not going to talk about anything about San Antonio Bay.

THE COURT: I thought you just asked him a question about San Antonio Bay.

MR. TAYLOR: That's what I heard, your Honor. That's why I stood up.

THE COURT: Do you want to read that question -- replay that question, Ms. Gano, to make sure I didn't mishear.

THE COURT RECORDER: Yes, your Honor.

(Court recorder played recording beginning at 5:02 p.m.)

THE COURT: Okay. That's --

THE COURT RECORDER: Okay.

THE COURT: That's sustained and the answer is struck. When somebody stands up to object, don't speak.

THE WITNESS: I remain silent.

THE COURT: Well, you answered it.

THE WITNESS: I hadn't seen the gentleman rise, your Honor.

THE COURT: That's all right. I'm just saying we should all be looking out.

THE WITNESS: I will try harder.

THE COURT: Thank you. I know this is not your regular milieu here. So --

BY MR. TAYLOR:

Q Okay. And I just want to be clear. Do blue crabs have a range of salinity that they prefer to live in between near freshwater and near full-strength seawater?

A They are found and are physiologically and ecologically productive and grow and survive throughout that range.

Q There's been a lot of testimony about blue crab size.

MR. TAYLOR: If we can put back up the life cycle, Defendants' Exhibit 259.

Q You mentioned that the juveniles have a range of, I think, 5 millimeters up to possibly a hundred and --

A Twenty.

Q -- twenty millimeters. How long would it generally take for a crab that is 20 millimeters in size grow to be 30 millimeters or larger?

A Three to four weeks.

Q There was testimony by Mr. Kirkwood, a narrator on one of the whooping crane tour boats, that whooping cranes prefer silver-dollar sized blue crabs. Do silver-dollar sized blue crabs have a salinity preference?
A No, they don't.
Q Okay. All right, now let's talk about the factors that impact -- in your opinion, impact distribution or abundance of blue crabs, okay?
A Certainly.
Q In your mind, is there a difference between distribution of blue crabs and abundance of blue crabs?
A There is and I think it's an important difference.
Q Okay. Can you explain to us what is the difference between distribution and abundance of blue crabs?
A So abundance would refer to the total number of crabs in an estuary system. So it would refer -- if we're talking about the Guadalupe, it would refer to the total number of blue crabs in that estuary. The distribution refers to how that number of crabs are distributed in space and I draw the distinction because different factors affect abundance and distribution of crabs.
Q Let's talk about those factors. In your opinion, does temperature affect the abundance of blue crabs?
A Temperature affects the growth of blue crabs. So it affects the time it takes to complete a generation and so it

would affect the abundance of blue crabs, yes.
Q Does temperature also affect the distribution of blue crabs?
A Temperature does affect the distribution of blue crabs through broadly similar mechanisms by a direct effect on their growth rate.
Q Dr. Montagna testified that temperature has the greatest impact on the distribution of blue crabs. Would you agree with that?
A From his analysis, it certainly supports that and I would that from my own experience as well.
Q In your opinion, does year impact the abundance of blue crabs?
A Year is also a very important variable from my own experience and also from the results that Dr. Montagna presented in his amended report.
Q And --

MR. BLACKBURN: Your Honor, if I may. This was not covered -- as far as I know, there was no amended report that we were issued after he reviewed Dr. Montagna's amended report. Is that right?

MR. TAYLOR: Right. He has one report but we got Dr. Montagna's report about two weeks ago and so he hasn't had an opportunity -- I mean, this is his only opportunity to express opinions on the amended report that we got after the

deadline to submit amended reports.

THE COURT: You still have an obligation to supplement.

MR. BLACKBURN: And we've received no supplementation, your Honor. So I would just -- I would object.

THE COURT: Was he here when that witness testified?

MR. TAYLOR: He was not, your Honor.

THE COURT: Okay. I'm going to sustain the objection.

MR. TAYLOR: Okay.

BY MR. TAYLOR:

Q Can you generally talk about the factors that impact abundance of blue crabs other -- we talked about temperature. Are there other factors that impact the abundance of blue crabs?

A Probably the most important factor is that the reproductive success of blue crabs varies considerably from year to year. Some years physical factors and random factors coincide in such a way that their reproductive success is considerably higher in one year than it is in the other year. So we expect to see high interannual variability in blue crab abundance.

Q Okay. Other than interyear variability, are there other factors in your opinion that impact the abundance of blue

crabs?
A I think the two we've talked about are probably the two most important one and from the large scale. If we look within the year, there will be a pattern in abundance from month to month timed to the cycle of reproduction because crabs, like all other marine animals, have far more offspring initially than they need to replace themselves because of the high mortality rate. There is a strong monthly pattern in abundance with peaks in abundance immediately following reproduction when the juveniles enter the estuaries to declines in abundance as they grow larger and older.
Q Okay. Are there any factors, in your opinion, that affect the distribution of blue crabs that we haven't already talked about?
A Dissolved oxygen can be an important factor affecting the distribution of blue crabs. Like all marine animals, large marine animals, they require oxygen in the water to breathe and so in conditions when there is low or no oxygen in the water, the crabs avoid those areas.
Q Any other factors, in your opinion, that impact the distribution of blue crabs?
A As I mentioned earlier on, the blue crabs are very susceptible to predation, particularly by other blue crabs and so they use structured habitats such as marshes, such as oyster reefs and other areas as a refuge from predation and so habitat

would be another factor that affects the distribution of blue crabs.

Q Okay. Let's take a look at Plaintiff's Exhibit 69. Do you understand that Plaintiff's Exhibit 69 is a graph showing the overall decline in blue crab populations on the Texas coast over the last 30 years?

A Yes. I believe it was from --

THE COURT: What was the number again? I'm sorry, the exhibit number?

MR. TAYLOR: Plaintiff's Exhibit 69.

THE COURT: Thank you.

BY MR. TAYLOR:

Q And we've talked about the distinction between abundance and distribution. Does this graph show a decline in abundance or distribution?

A This is a decline in overall abundance coast-wide in Texas based upon surveys conducted by the Texas Parks & Wildlife Department.

Q And have you observed an overall decline in blue crab abundance on the Atlantic coast?

A There are several areas along the Atlantic coast which have seen also broad-scale declines in abundance, most notably the states of Georgia, South Carolina and the Atlantic coast of Florida.

Q In Georgia, South Carolina and Florida that have

experienced long-term declines in blue crab abundance, have there been determinations of the cause for that long-term decline?

A There are two primary hypotheses that are put forward for the decline. The analyses are not so definitive to distinguish between them but both of the hypotheses have support. One would be broad-scale climatic changes. The ocean environment is subject to changes in phase. There are decade-long or perhaps longer periods that favor one type of environment over the other and these broad-scale climatic changes have been shown to affect blue crab abundance and then the pattern of exploitation. As I answered one of the judge's questions earlier that there's a great deal of pressure on blue crab in many of the estuarine environments that mean sadly we're overharvesting them in many areas.

Q Are there areas that you have researched that have not experienced or have reversed a trend of a long-term decline in blue crabs?

A Yes, there are. We -- the Chesapeake Bay most recently is a success story in able to reverse a decline in abundance.

THE COURT: How?

THE WITNESS: Based upon -- in large part based upon research that we conducted in my group, we recommended banning the harvest of females from October -- in the fall when females begin to migrate down to the high-salinity water in which they

release their eggs and we've been able to increase the crab population in the Chesapeake Bay by three-fold in four years as a result of that management measure.

BY MR. TAYLOR:

Q If you wanted to determine the reasons for this decline that we see on the Texas coast, is there some type of study that could be performed?

A To understand the patterns in these data, you need to conduct an integrated analysis that combines both these data that come from the surveys that agencies conduct and data from recreational and commercial fisheries that harvest blue crabs either directly because they target them or indirectly such as the shrimp fishery that catch blue crab inevitably when they pull a shrimp troll through the water together with information on the ecology of these animals. These integrated analyses are known as stock assessments.

Q And have you performed such a stock assessment for the areas that you have researched?

A We've performed stock assessments for every state from New Jersey down to the Atlantic coast of Florida, yes.

Q And did Dr. Montagna perform such an assessment for the Guadalupe Estuary?

A No, he didn't. In fact, Mr. Montagna did not include any information on commercial harvests from the Guadalupe ecosystem and I did note that I felt that was a substantial oversight.

Q In the stock assessments that you've performed in your research on blue crabs, have you been able to reach any conclusions?
A In the vast majority of those systems, the declines, our evidence suggests, have been due to overexploitation.
Q Have regulations been enacted in Chesapeake Bay and other places that you've studied to try to curtail the decline in blue crab abundance?
A They have. In the Chesapeake Bay, for example for a long time they tried to restrict the fishery by what are called "input controls." So they'd change the number of days a person could fish, the number of pots they could fish, the number of hours they could fish. Those are very inexact tools and we've seen very, very little response in abundance. It wasn't until we put in these direct controls that I was explaining about limiting the female harvest by -- after a certain date, banning the harvest of female crabs because they're caught in crab traps. You can throw them back without any harm and we've seen spectacular success.
Q And that's the threefold increase in the four --
A Three-fold --
Q -- years you mentioned?
A Yes, it is.
Q How do the commercial fishing regulations in Texas compare to those that have been enacted in the Chesapeake Bay?

A The --

MR. BLACKBURN: Objection, your Honor. That's beyond the scope for sure.

THE COURT: Of what?

MR. BLACKBURN: I think that's beyond the scope.

MR. TAYLOR: This has been done effectively using life histories that interrupt --

MR. BLACKBURN: There's nothing about Texas fishing regulations.

MR. TAYLOR: Yes, he talks about how commercial exploitation, Texas Department of Wildlife, Guadalupe Estuary has expensive crab fisheries.

THE COURT: Overruled. I just -- I want to hear it.

MR. TAYLOR: Okay.

BY MR. TAYLOR:

Q So my question, Dr. Miller, is how do the regulations in Texas compare to those that have been implemented in Chesapeake Bay and elsewhere that have seen success.

THE COURT: Take a guess. Go ahead.

THE WITNESS: Texas has continued to use what I described as "effort controls" by limiting the entry of fisherman into the fishery, by limiting the number of people they license, by trying to control the number of traps, by trying to control the amount of effort. Those are very inexact approaches.

BY MR. TAYLOR:

Q Let's look at Defendants' Exhibit 261 and is this a pie chart that you attached to your report in this case?

A Yes, it is. It came from my report and it came from data from the Texas Parks & Wildlife website as indicated.

Q Can you explain what we see in this pie chart?

A These are the distributions of commercial blue crab catches from the different estuarine ecosystems along the coast of Texas averaged for the period 1983 to 2005 expressed here as the proportions of the total. So the larger the segment of the pie, the larger the fraction of the total Texas harvest comes from that different -- from that system.

Q The large segment of the pie that we see down at the bottom left-hand corner that has 813.74 in it, does that represent the commercial blue crab catches in the San Antonio Bay?

A Yes, it does. It's the largest single region of commercial harvest within Texas.

Q Larger than all the other bays?

A Not combined but individually larger than all the other bays.

THE COURT: I didn't -- I need the number of the exhibit.

MR. TAYLOR: This is Defendants' Exhibit 261.

THE COURT: Thank you.

BY MR. TAYLOR:

Q In your opinion if you wanted to make sure the crabs were abundant and available for the whooping cranes in San Antonio Bay, what if anything could be done?

A I think figure speaks for itself. I would restrict harvest more effectively --

THE COURT: In the fall?

THE WITNESS: -- more effectively than it has been done. Whether or not the same approach would be appropriate, we did ours with -- in cooperation with the commercial water limits. It's much easier if you have them on your side, your Honor, than you're going against them. So --

THE COURT: How do you do that?

THE WITNESS: A large amount of outreach, a large amount of time sitting down talking as you and I are, building trust, building relationships --

THE COURT: It just seems that it's good for the crab industry to do this.

THE WITNESS: It -- by tripling the number of crabs --

THE COURT: It ought to be.

THE WITNESS: -- they are allowed to harvest 46 percent of all the crabs. If we triple the number of crabs, they get 46 percent of three times as many crabs. It should --

THE COURT: It's good economic sense.

THE WITNESS: It's -- yeah. It should be very straightforward, I think.

THE COURT: That is something to think about if there's a plan.

MR. TAYLOR: Pass the witness, your Honor.

THE COURT: Go ahead.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Good afternoon, Dr. Miller. I'm Jim Blackburn.

A Good afternoon, Mr. Blackburn.

Q And I'm sorry I didn't get Mr. Irvine to examine you. It would have been two countrymen sort of talking with each other. So --

THE COURT: It'd be too confusing for me.

MR. BLACKBURN: Yeah.

MR. IRVINE: Me, too, your Honor.

BY MR. BLACKBURN:

Q Now -- if you'll give me just a second, your Honor. There you go.

Now, let me ask you to try to help me understand a little bit. I think your testimony was that -- or let me just ask you. In terms of sort of crab dynamics, there is -- am I correct -- in general, there is a movement of crabs from the female out into the higher-salinity waters, lays her eggs, the young migrate back into the nursery area, mature and basically

do it all over again. Is that a standard life cycle for blue crabs in, say, the Texas Gulf coast generally?

A It really is. They -- the juveniles come back into the estuary. They settle in generally high-salinity waters. They disperse from those areas because of competition amongst one another. They move away through what are called "density-dependent" processes. They eventually spread throughout the estuary. They mature. They mate and the females walk back down to the mouths of the estuaries to release their eggs all over again.

Q And is it fair to say when they come back into the estuary, they're seeking out the lower-salinity waters for various reasons perhaps unrelated to salinity?

A I don't think that's fair to say that, no.

Q Do you think it is specifically related to salinity?

A They come in and they settle as soon as they come into the estuary. So their initial settlement is, in fact, in high-salinity waters.

Q And then they --

A And then they disperse.

Q -- and they disperse back into lower-salinity water, correct?

A They disperse throughout the estuary. Some of them inevitably go into low salinity waters. Some will remain in the high-salinity waters. It's not an obligate requirement --

as I was explaining earlier in my comments to the judge. It's not an obligate move that they have to go to low-salinity conditions.

Q Got it, understood that -- and in fact they can survive apparently perfectly well in high-salinity water?

A Yes.

Q Assuming they have something to eat and they don't get eaten?

A Yes.

Q So going back up into the lower-salinity water is a defense mechanism and a feeding mechanism, according to your testimony --

A Yes.

Q -- is that right?

A Yes. It is one way to avoid being eaten. It's not a guarantee of course and it's one way to avoid remaining in areas where there are lots of your brothers and sisters that are also trying to eat the same food that you are.

Q Now, it's taken me a while. You're a very precise man and I compliment you on that but it's somewhat confusing to someone who perhaps bounces all over the place. There's a difference, is there not, between abundance or the ability to even survive and distribution?

A There's a difference between abundance and distribution, yes.

Q And while, in fact -- well, those are two separate things, right?
A They can be, yes.
Q And isn't it fair to say that crabs -- you will find more crabs, particularly juvenile crabs, at sort of a 20-millimeter, 30-millimeter stage in lower-salinity water?
A No, I don't think that's fair to say.
Q You don't think that they're distributed toward low-salinity water?
A I think the sizes up to the limit that you gave me of 20 to 30 millimeters are beginning to spread throughout but there is still this residual history that they are tied to coming into the estuary at the mouth --
Q Okay. So --
A -- and settle at the mouth.
Q -- so I'll make them a little bit larger.
A As you get larger, they spread further and more broadly within the estuary, yes.
Q And that distribution will become more related to salinity gradients, correct?
A I will answer "Yes" with the proviso that I'm not saying that it is a -- salinity is a causal factor.
Q Understood, understood. I was trying to make that distinction in an earlier question. From your testimony, there are perhaps other reasons why they would seek out these waters

other than certainly they have to be in that water to survive?
A Yes, yes.
Q Okay. Now, freshwater inflow is related not only to salinity but it brings nutrients with it?
A Yes.
Q And without those nutrients, there would not be as abundant of a food supply. Do you agree with that?
A Yes, I do.
Q In fact, it's essential for the bay productivity from a nutrient standpoint?
A It's important. I wouldn't say it's essential.
Q And --

THE COURT: Freshwater inflow is not essential to an estuary?

THE WITNESS: It's essential to the definition of an estuary --

THE COURT: Oh.

THE WITNESS: -- but Mr. Blackburn's question was, was it essential to the productivity of the estuary and I would just draw the distinction that it is not --

THE COURT: Tell -- I don't get the distinction.

THE WITNESS: As I answered to your question that there would still be productivity in the estuary if we did this hypothetical experiment where it became full-strength seawater because of the shallowness of estuarine ecosystems. The

shallowness allows light to penetrate throughout the --

THE COURT: For the algae --

THE WITNESS: Yes.

THE COURT: -- for the good algae.

THE WITNESS: Yes, yes.

THE COURT: Okay.

BY MR. BLACKBURN:

Q But they still need nutrients like nitrogen and phosphorus and silica and things like that, right?

A Yes, they do, yes.

Q And those come in with freshwater inflow, correct?

A The nitrogen and phosphorus certainly do. The silica tends to be internal to the estuary itself.

THE COURT: It's in the sand, right? It's in the dirt?

THE WITNESS: It is in the dirt, yes, your Honor.

BY MR. BLACKBURN:

Q And -- but nitrogen and phosphorus certainly would be elements of the freshwater inflows?

A Yes, very -- particularly in areas -- in catchments in which agriculture is an important part, yes.

Q And similarly with regard to what's called a "nursery area," is that also another way of talking about a place to find refuge?

A Yes.

Q So the marshes, among other things, become places that they can hide among the stalks, for example?
A Physical -- as I said, physical structure is very important to juvenile blue crabs -- marshes, oyster reefs, anything that provides a physical place that they can hide.
Q And there was this earlier testimony, Spartina alterniflora is a type of marsh plant?
A Yes, it is.
Q And that was used as an indicator species for salinity on Nueces Bay?
A I take your word for it.
Q I think it was the prior witness that testified to that.
A And I take your word for it.
Q So many of the things that are necessary to provide adequate habitat for the blue crab would be related to salinity, correct?
A To a degree, yes, that they're -- that Spartina has certain requirements for salinity different than Halodule, different than other submerged aquatic vegetation. The species may change but there are going to be different types of submerged aquatic vegetation in different salinity areas.
THE COURT: So you're saying that other -- the other nutrients would take the place of the ones that died off in a higher salinity?
THE WITNESS: Other species could --

THE COURT: Other species could.

THE WITNESS: -- take the place, yes, your Honor.

THE COURT: Have you seen that happen, I mean, specifically?

THE WITNESS: Yes. There are changes of the species that characterize what we call "submerged aquatic vegetation." Spartina is a little bit different in that it's -- it is on what's called the high marsh that -- so it occasionally goes dry and then gets flooded again. There are other species of plant that actually live in the water all the time and those are very, very important for crabs.

THE COURT: And they're everywhere on the ocean floor?

THE WITNESS: Not everywhere. They are limited by light and they're limited by wave action. If there's too much wave action, they get --

THE COURT: So a bay or estuary would be a perfect place for those --

THE WITNESS: Yes.

THE COURT: -- that plant life --

THE WITNESS: Yes.

THE COURT: -- which is vital to the blue crab?

THE WITNESS: Important to the blue crab.

THE COURT: Important -- sorry. See, you are much more exact than I am.

BY MR. BLACKBURN:

Q And is it fair from your testimony, not much of anything is vital to blue crab but a lot of things are important?

A I think there are some things vital to blue crab, yes.

Q I was afraid you were going to say that.

A I thought you were.

THE COURT: Tell me what's vital.

THE WITNESS: Having the ability to have year classes. So the presence of adults is vital to the continued success of blue crab. So surprisingly enough, there are fisheries' managers that do not make the connection that if you don't have adults, you are not going to have offspring.

THE COURT: No?

THE WITNESS: Yes. Yes. There are many fisheries' managers -- that relationship between the number of adults and number of offspring in fisheries is called "stock and recruitment" and there are many well-known fisheries' management -- managers who say there is no stock-and-recruitment relationship.

THE COURT: Is that -- is it in Texas?

THE WITNESS: I've also come across it in Canada.

THE COURT: Okay.

BY MR. BLACKBURN:

Q Now, would you agree that there are certain predators of the blue crab that are more predominant in highly-saline

conditions?
A Yes.
Q And so it's an additional threat to a blue crab -- you know, the blue crab may be perfectly okay to be able to live in high salinities but there are other things out there that make it a little more perilous. Would that be fair?
A There are, yes.
Q And --
A I will add that I -- as I also said that one of the biggest predators of blue crab is blue crab themselves.
Q I understood but once you get into highly saline waters, you have a number of parasites and diseases; is that correct?
A There are typically more parasites and diseases in high-salinity conditions than low-salinity conditions, yes.
Q And I'm going to read some names that I'm not real familiar with and you might chuckle at me and that's okay.
A I promise I won't.
Q Oh, I --
THE COURT: And just to connect, I want to make sure the parasites and diseases that are in -- that live in higher salinity, do they affect the blue crab?
THE WITNESS: Some of them do. One of the particular ones that I'm sure Mr. Blackburn is going to read is Hematodinium.
MR. BLACKBURN: Oh, yes. I was going to read that.

THE COURT: He'd forgotten all about that.

THE WITNESS: And that one certainly is more prevalent in more saline conditions than fresh conditions. It's also more prevalent in warm conditions -- so in summer than in wintertime.

BY MR. BLACKBURN:

Q And Gulf waters would be warmer generally than would be, say, some of the Atlantic waters?

A Well, certainly but also within the Gulf, the seasonal temperature cycle. They will be -- the disease will be more virulent in the summer than it will in the wintertime.

Q So what about Loxothylacus texanus?

A This is a predator that affects the eggs themselves.

Q And those eggs are laid in the saltwater?

A Well, the eggs are carried by the female and she becomes infected -- or the eggs become infected as she migrates down into the high salinity.

Q So the longer she's in high salinity, the worse for her?

A Potentially, yes.

Q And you mentioned --

THE COURT: Well, the worse for the eggs?

MR. BLACKBURN: Worse for the eggs, yes.

THE WITNESS: Yes.

THE COURT: So -- does she drop the eggs or does she wait until they're larvae or --

THE WITNESS: They develop on her abdomen.

THE COURT: On her.

THE WITNESS: The picture I showed you was orange. As they develop, they eat the yolk which is what gives the yellow and then as she's ready to release them, she swims right up to the surface and she pulsates her abdomen which effectively ejects the larvae out. So she doesn't release the eggs. The larvae hatch on her abdomen and her movements --

THE COURT: That's what I was wondering.

THE WITNESS: -- cause the larvae to go out into the water current.

THE COURT: Incredible.

THE WITNESS: They are a remarkable animal.

BY MR. BLACKBURN:

Q Now, I have to concur. Everything I've learned about blue crabs, they are an incredible animal and I think it's very interesting that you work with them.

How about Octolasmis mulleri?

A That's another one that I believe is also more common in high-salinity waters.

Q And does it also attack the blue crab?

A Yes, it does.

Q And the one we mentioned earlier --

A Hematodinium?

Q Yeah, that one.

A Of the ones you've mentioned, that's the most -- potentially the most important. The virulence of that one is more so than the other diseases you've mentioned.
Q And would you agree it's more prevalent at 26-plus parts per million -- I mean, parts per thousand of salinity?
A It's more prevalent at high salinities. I'm not an expert on the salinity distribution of that disease.
Q And how about Carcinonemertes carcinophila?
A This is another one that affects the female crabs as she's beginning to spawn and that's another one that is also a high-salinity disease.
Q So parasitism and disease is an absolute relationship with higher salinity?
A No. The ones you've chosen are in absolute relationship. There are others that are more common in fresher water.

THE COURT: Are they as dangerous?

THE WITNESS: Some of them are much more dangerous. There are some viral infections that kill everything that's infected.

MR. BLACKBURN: And those are --

THE COURT: And those are in bays and estuaries?

THE WITNESS: Yes, your Honor.

BY MR. BLACKBURN:

Q On the Texas coast?
A They've been reported in Mississippi. I don't know that

they've been reported --

THE COURT: That's not the same.

THE WITNESS: I understand. I should have been much more precise.

MR. BLACKBURN: Oh, it's -- you can be --

THE COURT: We all say in Texas, thank God for Mississippi.

MR. BLACKBURN: For more reasons than just the --

THE COURT: I wasn't going to go for all the reasons.

MR. BLACKBURN: Pass the witness, your Honor. No further questions.

MR. TAYLOR: No redirect, your Honor.

THE COURT: Thank you.

MR. FERNANDES: Would it be a good time to break?

THE COURT: Do you want to put on somebody else?

MR. FERNANDES: No, we're going to go have some crabs.

THE COURT: A proper ending for today.

MR. FERNANDES: All right.

(This proceeding adjourned at 5:38 p.m.)

CERTIFICATION

I certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

January 27, 2012

Signed **Dated**

TONI HUDSON, TRANSCRIBER

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION

THE ARANSAS PROJECT,	)	CASE NO: CA-C-10-075
	)	
Plaintiff,	)	CIVIL
	)	
vs.	)	Corpus Christi, Texas
	)	
BRYAN SHAW, ET AL,	)	Thursday, December 15, 2011
	)	(8:29 a.m. to 9:58 a.m.)
Defendants.	)	(10:14 a.m. to 11:58 a.m.)
		(1:57 p.m. to 3:19 p.m.)
		(3:48 p.m. to 5:16 p.m.)

BENCH TRIAL - DAY 8

BEFORE THE HONORABLE JANIS GRAHAM JACK,
UNITED STATES DISTRICT JUDGE

Appearances:	See next page
Court Recorder:	Velma Gano
Courtroom Clerk:	Lori Cayce
Transcribed by:	Exceptional Reporting Services, Inc. P.O. Box 18668 Corpus Christi, TX 78480-8668 361 949-2988

Proceedings recorded by electronic sound recording;
transcript produced by transcription service.

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Corpus Christi, Texas; Thursday, December 15, 2011; 8:29 a.m.

(Call to Order)

THE COURT: Are you all ready?

MR. UNIDENTIFIED: Yes, your Honor.

THE COURT: Yes, sir?

MR. WILLIS: Your Honor, just briefly a housekeeping matter. We're trying to locate or actually go pick up witnesses flying in today. So we just want to make sure if it's okay with the Court, on occasion we may have counsel leave the courtroom.

THE COURT: That's fine.

MR. WILLIS: Thank you.

MR. WAITES: Your Honor, if I may offer a few exhibits. My understanding is they're unopposed. These are Plaintiff's Exhibits 373, 374, 376 and 388.

MR. TAYLOR: No objection, your Honor.

THE COURT: They're admitted.

(Plaintiff's Exhibits Numbers 373, 374, 376 and 388 were received in evidence)

Do you want to call your next witness?

MR. MC CARTHY: Good morning, your Honor.

THE COURT: Good morning.

MR. MC CARTHY: This morning San Antonio River Authority on behalf Defendant-Intervenors would call Dr. Stephen Davis.

THE COURT: Another part of the SAGES report, right?

MR. MC CARTHY: Dr. Davis was a participant --

THE COURT: Okay.

MR. MC CARTHY: -- in the SAGES report. Yes, your Honor.

THE COURT: Thank you. Would you administer the oath?

THE CLERK: Yes, your Honor.

Please raise your right hand.

STEPHEN DAVIS, DEFENDANT-INTERVENOR'S WITNESS, SWORN

DIRECT EXAMINATION

BY MR. MC CARTHY:

Q Good morning, Dr. Davis.

A Good morning.

Q A couple of housekeeping matters. We've been advised that it's easier to hear you if you are closer to the microphone and that if you will put your elbow on the table, it would allow you to physically be closer. Please don't touch the microphone or avoid trying to touch it.

And there should be a laser pointer up there by you. Do you have that?

A Yes, I do.

Q Okay, great. Dr. Davis, would you please introduce yourself to the Court and tell the Court your name?

A My name is Stephen Davis. I am a wetland ecologist with

the Everglades Foundation.

THE COURT: With what?

THE WITNESS: The Everglades Foundation.

MR. MC CARTHY: And if I could have Defendant Exhibit 307 put up, please.

BY MR. MC CARTHY:

Q Dr. Davis, is Exhibit DX307 a copy of your current Curriculum Vitae?

A Yes, it is.

Q Okay. And you provided that as part of this trial?

A Yes, I did.

Q Okay. Dr. Davis, you said you're currently a wetlands ecologist with the Everglades Foundation. That's the Everglades in south Florida?

A Yes, correct.

Q Okay. And how long have you been with the Everglades Foundation?

A About two-and-a-half years now.

Q Okay. And could you provide the Court with some background on how you got to the Everglades Foundation and what your function there is?

A Well, my graduate research was focused on wetlands in the Everglades. From there I took a position at Texas A & M University but continued doing research in south Florida wetlands as well as Texas wetlands.

Q And by way of your education you said your "graduate research."

What's your undergraduate degree in?

A Biology.

Q Okay. And do you have a master's degree?

A I have a master's degree in biology environmental science, yes.

Q Okay. And then your doctorate?

A Is also biology.

Q Okay. And following receipt of your doctorate could you please describe for the Court your professional background and your work experience?

A My research over the years has primarily been focused on understanding wetland ecosystems and the interactions between hydrology, plants and the food web, those ecosystems.

Q Okay. Plants and what about fauna animals?

A I sort of lump all of that into what is called the food web, basically from small bugs all the way up to high trophic levels such as wading birds, alligators and so on.

Q So you may use that term "food web" several times during your testimony. Would you please explain or define that for the Court?

A The "food web" is essentially a description of the linkages from very small animals, bugs if you will, and how those animals are consumed, who consumes them, and how that

material gets transmitted up to higher trophic positions such as whooping cranes.

Q And with respect to the wetlands what parts of the country, what geographically, where have you done research and work?

A I've worked in marshes in coastal South Carolina. I've worked in a few marshes along the coast in Texas, primarily San Antonio Bay, Galveston Bay, and coastal wetlands all around south Florida.

Q With respect to your work in the coastal area and the Texas Gulf Coast and specifically with respect to San Antonio Bay, when did you begin your work in San Antonio Bay?

A We initiated the design of the study in early 2003.

Q Which study, Dr. Davis --

A This was the SAGES study, which stands for the San Antonio Guadalupe Estuarine System. And we initiated field efforts in that study in about June -- May or June of 2003.

Q And the design work for that, was that prior to the field work?

A The design work began probably late 2002 all the way up to the middle of 2003. And we continued to develop the design after we began monitoring some of the core parameters in the study.

THE COURT: You began monitoring what? I missed the word.

THE WITNESS: The initial parameters that we monitored in this study, we knew that we needed to get a handle on the hydrodynamics, so we measured -- we had devices that I believe we'll show you an image of that allowed us to measure continuously fluctuations in water level at different areas in the marsh.

BY MR. MC CARTHY:

Q As part of your professional background, you said you were at Texas A & M. Was that in a teaching capacity?

A Yes. I was hired in as an assistant professor in the Department of Wildlife and Fisheries Sciences in 2001.

Q And from that position did you work your way through the system in other positions at Texas A & M?

A As I grew in that position I became involved with a few different interdisciplinary faculties of evolutionary biology and conservation biology, hydrological sciences and water management. These are just groups of faculty across different departments and different schools that have research in a common area.

Q Okay. And among those faculty disciplines do they include marine biology?

A Yes.

Q And wildlife fisheries and sciences?

A Yes.

Q Okay. And when did you leave Texas A & M?

A I initially went on a sabbatical to continue some of the research that I had been doing in south Florida. That would have been around 2008 in the fall, I believe. And then from there I went back to Texas A & M, taught for a semester, and then took a leave of absence from Texas A & M that continued for the first two years of my tenure at the Everglades Foundation. I resigned my position at Texas A & M in late August of this year.

Q And what was your title when you resigned from Texas A & M?

A Associate Professor.

Q And was that a tenured position?

A Yes, it was.

Q Okay. And during your teaching time did you receive any awards or honors?

A I received a few over the years, none that I really, you know, really paid much attention to. I got most of my reward from teaching and advising graduate students, spending a lot of time in the field.

Q As part of your faculty duties you mentioned that you were an advisor to graduate students?

A Yeah. That's actually one of the things I was most proud of in my time at Texas A & M is that I advised students from multiple departments and colleges across the university and even different campuses like Texas A & M Galveston. This is

primarily because wetlands studies it's a very interdisciplinary program that involves aspects of hydrology, chemistry, biology. And so when you study wetlands you have to have a proficiency in all of these areas. So I attracted students from all of those different disciplines as a mentor.

Q And was your position related to just master students or doctoral students, also?

A It was about a fifty-fifty split. About half the students that I worked with were Ph.D. students. The other half were master's.

Q And some of these students worked with you in connection with the SAGES program?

A That is correct, yes.

Q Okay. And part of that was in your position as their doctoral mentor?

A Yes.

Q Okay. And in your resume, Dr. Davis, you've noted a number of peer-related publications; is that correct?

A Yes.

Q And among those include publications related to marsh ecology in wetlands?

A That is correct, yes.

Q And are some of those publications specific to your work in San Antonio Bay?

A Yes.

Q Okay. And with respect to your work on the SAGES program, that was done -- you worked with Dr. Slack; is that correct?
A That is correct.
Q Okay. And did you also have occasion in that program to work with Dr. Chavez-Ramirez?
A I worked with Dr. Chavez-Ramirez at the beginning of our study. He was very instrumental in helping us to identify our sampling sites and also early on in the SAGES project guiding us as part of a peer-review team, if you will.
Q So was he part of your design work then?
A He absolutely helped establish design aspects of our study in addition to sampling sites, yes.
Q So then in the implementation of the project he worked with you, also.
A He continued to --
Q Or consulted with you. I'm sorry.
A -- play a role in reviewing our reports and attending these peer review meetings that we held.
Q With respect to the work you did in San Antonio was it limited to the marshes or did you do other work in San Antonio Bay?
A As part of the SAGES study I was focused almost entirely in the marsh at Aransas Refuge. As parts of other studies we worked in San Antonio Bay, Mesquite Bay, around Cedar Bayou, in that area. And we focused primarily on relating inflows to

spatial patterns and water quality across the bay. So for almost two years we did very intensive spatial mapping of water quality, phytoplankton and zooplankton community dynamics and related that to physical forcings like fresh water inflows, tides, season, and so on.

Q So the record is clear, your work in San Antonio Bay was not just with the SAGES project; you did other studies there?

A That is correct. And those were studies funded by U.S. Geological Survey and NOAA through the Texas Sea Grant Program.

Q Dr. Davis, your work in San Antonio Bay was based upon your personal visits to San Antonio Bay and actual observations; is that correct?

A Yes.

Q Okay. It wasn't limited to just literature review or review of data provided by students?

A No, no. I spent a significant portion of the first year and also time in the subsequent years of the SAGES study in the marsh working with the students.

Q Dr. Davis, in my questioning I'm going to use an acronym or an abbreviation called TCOON in some of my questioning.

Would you please explain to the Court what "TCOON" is?

A TCOON is the -- let's see if I can get this right. The Texas Coastal Ocean Graphic Observation Network. This is a

series of monitoring sites across the Texas coast primarily focused in bays and estuaries that measure everything from water level to wind to salinity PH, other types of water quality parameters. These are sites that have been around for a couple of decades now and the data are available online almost in real time.

Q And so the court reporter has it, would you please spell the acronym TCOON?

A It's T-C-O-O-N.

Q And that's all capitalized?

A Yes.

Q Okay. Thank you. Now, you described TCOON runs a group of monitor stations. What do those stations monitor?

A As I said, primarily hydrologic parameters such as water level. There are a few that actually measure flow. Most of them are measuring fluctuations and water level in the bays and estuaries. Several of them are equipped with water quality sensors that will measure everything from temperature to salinity PH, these very basic types of water quality variables.

Q Do they monitor dissolved oxygen at all?

A I believe there are a few. It gets tricky with measuring dissolved oxygen continuously in these types of systems because the sensors need to be replaced and refreshed on a really short interval. So salinity and those types of sensors are more durable and can run for a longer period of time without

maintenance. But I would guess that there are a few that may be measured dissolved oxygen.

Q Okay. And this information is available online.

A Yes, it is.

Q Okay. And who maintains the TCOON system, operates it?

A I believe it's A & M Corpus Christi or it's one of the local institutions here. They have a program that's focused on that.

Q Okay. And is the TCOON data data that scientists such as yourselves working in this area regularly review and rely upon?

A Absolutely. Those data sets are invaluable for studies such as SAGES and relating observations in the field to more regional scaled patterns and water quality.

Q In some of the consulting work you've done do you represent -- today you're here on behalf of San Antonio River Authority, correct?

A Yes.

Q Okay. And San Antonio River Authority engaged your services in connection with this litigation; is that correct?

A Yes.

Q Okay. Other entities, do you work with environmental groups in connection with the research and studies you do?

A Yes, absolutely.

Q And can you describe some of that work, please, for the Court?

A In my capacity with the Everglades Foundation we are a rather small, not for profit, environmental organization that's focused on Everglades restoration. And we serve as sort of the glue for a number of environmental groups here, a club, Audubon, smaller more regional NGO's that have an area of interest in the Everglades. And we sort of bring them together as glue by being the science voice of the ecosystem. We have a small science staff and we serve as a source of information either through synthesis of existing science or through some of our own modeling and field studies. And we provide that information to them to help make decisions on which positions to take, whether it involves litigation, advocacy, so on.

Q Thank you, Dr. Davis.

MR. MC CARTHY: Your Honor, at this time we would offer Dr. Davis as an expert in marsh and wetland ecosystem ecology.

MR. BLACKBURN: Your Honor, first of all we don't object as long as the scope is restricted to what it was in the expert report. But I also want to -- we have not made *Daubert* objections on -- you know, in this case because it's a bench trial. But this is a witness where we will be making some challenges to certain aspects. Not as a *Daubert* challenge formally but through the cross examination, more to go to the weight than anything else.

THE COURT: Okay.

MR. MC CARTHY: Your Honor, two points. First with respect to the limitation of Dr. Davis' testimony within the scope of his report. Dr. Davis has been identified both in direct testimony and cross examination as a person with information that would be valuable to the Court that may exceed the scope of what his rebuttal report was provided. These are issues that the Plaintiffs --

THE COURT: Why haven't you supplemented?

MR. MC CARTHY: Because they've been raised during the actual trial, your Honor. We haven't had a chance to supplement them during the trial. These are questions that have been asked on cross examination as recently as yesterday afternoon of --

THE COURT: Let's just wait and get to them and see what happens.

MR. MC CARTHY: Thank you, your Honor. With respect to the *Daubert* --

THE COURT: Unless you want some advisory ruling.

MR. MC CARTHY: Not at this time, your Honor.

THE COURT: Maybe. How about that?

MR. MC CARTHY: With respect to the *Daubert* motions I believe that the Court had established a schedule and deadline for filing such motions, and none was filed by the Plaintiff within the scope of the Court's orders.

MR. BLACKBURN: This wasn't -- I'm sorry, I

misstated. I wasn't --

THE COURT: The way I understood it it's not a *Daubert* challenge. He just wants to vigorously cross examine your witness.

MR. MC CARTHY: Thank you, your Honor. Dr. Davis was also in the course of these proceedings designated with respect to factual knowledge and a person of interest. And I believe we'll be able to provide the Court answers to questions the Court has been asking throughout the course of this hearing and hope you'll take advantage of his presence here today.

THE COURT: Thank you.

MR. MC CARTHY: If I could please have DX Exhibit 399 put up, please.

BY MR. MC CARTHY:

Q Dr. Davis, are you familiar with this exhibit?

A Yes, I --

Q Would you -- I'm sorry.

A I am, yes.

Q Would you please describe it for the Court?

A This is -- the top photos here, this is a compilation of photos that essentially represents the stretch of coastal marsh at Aransas National Wildlife Refuge. This line that you see running through here, (indicating), that is the Gulf Intracoastal Waterway. We have identified here, (indicating), these boxes that represent areas of the marsh that we focused

on in my particular research group. We measured everything from water quality to water level, as well as vegetation focusing on the Carolina wolfberry at each of these sites. These photos down here, (indicating), just represent blow-ups of these boxes.

Q And the selection of these sites did you testify earlier was done in conjunction with consultation with Dr. Chavez-Ramirez?

A Not just Dr. Chavez-Ramirez but also Tom Stehn. He also participated in these recon visits out to the marsh.

(Pause)

MR. MC CARTHY: Could I ask you to put up DX400, please?

Q Dr. Davis, your testimony today regarding the mechanics of how the marsh works, is this exhibit one that you prepared in connection with your report?

A Yes.

Q Okay. And could you please explain to the Court what this represents?

A This is a depiction of the -- what I -- the term I will use is hydrodynamics of the marsh, of the bulk of the marsh at Aransas National Wildlife Refuge. This is intended to depict what I term as hydrologic connectivity. And the idea is that you have tidal waters that come in to the marsh, and in some periods the water levels are not high enough to connect with

these depressions that are along the landscapes. So this is the surface view and you can see a low-lying area. We'll refer to this as a pond. And this is depicting a tidal creek. This brown area is the salt marsh. And when water levels come in, sometimes they're not high enough to result in a connection between the tidal creek and the pond. There are other times of the year where water levels are high enough to create this connection.

And I'd like to first describe that high-water period and low-water period are not synonymous with low tide and high tide. In fact, the bulk of the marsh at Aransas National Wildlife Refuge is what wetland scientists would refer to as a high salt marsh. It's high, meaning that it's relatively high in elevation compared to the mean tidal level in the adjacent bays. So low-water periods coincide with times of the year where water levels are typically low, and the high tide of the given day during a low-water period may not be high enough to result in a connection event as depicted here.

There are other periods of the year where water levels are high enough, for instance, during a wind event where we had some of the prevailing winds out of the southeast that would blow water into the marsh and would be high enough to result in a connection event.

Q Okay. And with respect to the connectivity we've heard testimony in these proceedings about these marshes and ponds

being described as isolated.

Can you please explain for the Court what is meant by an "isolated pond"?

A Sure. In the previous image we have a number of ponds throughout the landscape in the marsh at Aransas Refuge. These what I call isolated ponds function essentially as this pond, Tidal Creek, interaction here, they're not always connected with surface water. It takes high water events to create a connection. So those ponds for much of the year are actually isolated. They may have water, they may be completely dry if they're not connected for an extended period of time. But they are isolated within the landscape.

There are other water bodies, tidal creeks and some of the inland bays, that have a more permanent connection. And we don't refer to those as being isolated because they're always connected.

Q Are there periods when the ponds are disconnected or not connected to the bay, are there prolonged periods of time when that happens?

A There are. And in our observations we found that typically the winter periods were the lowest water level periods of the year along this coast. So we had the longest period of disconnection resulting in some cases of complete dry down of these ponds when water levels were low for an extended period, yes.

Q Okay. What's the effect on the marsh ecology of the events of connection and disconnection?

A What this image down here doesn't show is that when you have a high water period, the marsh is usually inundated completely. And that's what facilitates the connection between bay waters, tidal creek and into these isolated ponds. So the marsh, everything is under water during the high water period.

What that allows for is a few things. From the standpoint of the marsh vegetation community it allows for the flushing of salts that accumulate when water levels are low and the marsh soils dry down. In fact, it's not uncommon to see salt crystals on the surface of this marsh when you undergo an extended period of disconnection. These soils can be -- and this is not uncommon for other high-marsh ecosystems such as this. The salinity of the soils can get to be two to three times the concentration of salt in sea water. So we're talking 70 to 100 parts per thousand. That's not uncommon.

So what these high water periods do is they help to flush the soils, and that makes conditions typically more favorable for the marsh vegetation. Even though they're accustomed to living in salty environments, they're growing in a salt marsh setting, they typically do better when those high salt concentrations are removed. And that's what this kind of inundation and flushing effect does for the marsh vegetation community.

What it does from the standpoint of the biota is it allows for access of things like fish, crabs, other invertebrates, it provides them access to the marsh. And what the marsh serves as is a source of food; the plant detritus and other things that are within the marsh; it's an important source of food for these organisms.

It's also a refuge of sorts because the structure of the marsh vegetation provides them with protection against large predators such as red drum and other fish or even larger blue crabs that might be searching for food. So these high water events that provide access to the marsh vegetation are important in that regard.

It also provides access to these pools. So when the water levels recede to the point that you see up here in this low water period where we have a disconnection, these ponds are then replenished with a high water period. They become replenished with crabs, fish, other organisms until those ponds are subsequently reconnected or sometimes they'll actually dry down to the point where everything in those ponds will die.

MR. MC CARTHY: Could I please have Defendant Exhibit 410, please?

Q Dr. Davis, these marshes were at sea level, right? Were at the coast, were at sea level?

A Yes.

Q Okay. But you've described this as a high marsh.

A Yes.
Q Does that mean that the marsh is not actually at sea level? What do you mean by "high marsh"?
A High marsh is a relative term. It's a designation of the hydroperiod of a coastal marsh. And just to give you a reference point, a low marsh is something that's typically inundated or flooded with each day's tide. So high tide each day is going to flood a low marsh.

And at Aransas Refuge we have a low marsh but it's a really narrow fringe along the outer edge. And the plant that typically dominates that zone is spartina alterna flora, which is smooth cordgrass. And the point I should make is that in these types of coastal wetlands you can tell exactly what kind of marsh it is by the vegetation community that's there. If we see spartina alterna flora, we know that it's a low marsh. If we start to see things like wolfberry, salicornia, disticulus, these other plants that are in association with this high marsh zone, we know it's a high marsh. So you can read the marsh and its hydroperiod by the plants that are there.

Getting back to this image up here, (indicating), this is all high marsh. And so it means that it's not inundated with each day's high tide. In fact, it requires a high water period that's often times associated with wind that will push water up into the marsh or a full moon or a new moon that results in a higher high tide. And this occurs on scales

of about every two weeks. That is usually high enough to get water into a high marsh zone. So it's a marsh that's not flooded on a scale of days. It's typically longer.

Q Now, Dr. Davis, it's difficult to see up on this screen, but on the little monitors you can tell right in this, (indicating), area there's a black image. Is that a backpack?

A Yes. This is -- well, these are two images of isolated ponds that we focused on with our hydrologic monitoring efforts. These devices in the middle of the ponds we tried to place them in the deepest area of the pond to measure fluctuations in pond water level. In this image you can see the pond is actually drying down, which wasn't out of the ordinary.

In this image here, (indicating), even though the pond is full, Rachel has her book bag -- which, trust me, is not waterproof -- sitting here along the edge of the pond. Because a lot of the edges of these ponds are actually almost a smaller levee. So the marsh could be inundated in this particular case, but there's a lip around the pond that sort of serves as a levee that impounds water in there. So this is a feature that was common to many of the ponds that we've looked at.

Q Okay. And you would have to have the higher tides you were talking about to flood over that lip to get the water into the pond; is that correct?

A That is correct.
Q Okay. And what's the importance of this connectivity with respect to the biology and the creatures you'll find in the pond such as the blue crab?
A Again, when these ponds go through an extended period of disconnection, typically what we find is that they dry down. And this is in the middle of a dry down right here. And in some cases these ponds would dry down completely to where there would be nothing living or perhaps things burrowed down in what remains of the mud. Sometimes they become so dry that the soils are cracked, and that indicates an extended period of disconnection. But again, these high water events that are necessary to get organisms into the marsh and into these ponds that -- you know, are an important source of nutrition for the food web.

MR. MC CARTHY: Could I please have Defendant Exhibit 401?

Q Dr. Davis --

MR. MC CARTHY: Can you actually shrink that just a little bit, please? Okay.

Q I wanted to do that because I wanted to show that Defendant Exhibit 401 is based upon Dr. Montagna's Exhibit 68 where he testified about the life cycle of the crab. But you've made an alteration to this exhibit. And again, I apologize; it's difficult to see on the screen, but you can see

on the monitors.

And you've got some scribbling here on the edges of the water here. Could you please explain to the Court what that's intended to represent?

A This life cycle diagram shows what's widely accepted in terms of a blue crab life cycle in a bay. What this doesn't show is the connection between the crabs and the marsh that lines the perimeter of these bays. And it's the marsh that's a critical aspect of the habitat for these organisms, particularly when they're of small to medium size and --

THE COURT: Are you talking about the crabs?

THE WITNESS: For the crabs, yes. And it's the access to that habitat, that refuge, that is an important part of their life cycle. They don't grow into adults if they don't have the source of food that they get from the marsh or the source of refuge from --

THE COURT: Now, I thought the crab guy said yesterday they could live anywhere without any of this.

MR. MC CARTHY: Your Honor, I believe Dr. Miller's testimony was that they can live in any -- the salinity did not affect them, that they came back to the marshes for purposes of habitat, food and protection.

THE COURT: Okay. But the salinity affects their food.

//

BY MR. MC CARTHY:

Q Dr. Davis, can you address that for the Court?

A The effect of salinity in an estuary is -- particularly in San Antonio Bay is different. There's a distinction that needs to be made between salinity in the bay and salinity in the marsh. And so the salinity conditions that may affect this cycle in the bay are different from the salinity conditions that would affect them or the marsh, as there's a separation for periods of time.

THE COURT: Okay. I'm just asking is salinity crucial to the marsh food that the -- a certain salinity critical to the marsh food that the crabs rely on to live.

THE WITNESS: The marshes that line San Antonio Bay, these are salt marshes. And again, these are as high marshes and not inundated regularly. The salinities in some of these soils -- and these are where the roots are embedded -- can be quite high at times.

BY MR. MC CARTHY:

Q Dr. Davis, let's --

THE COURT: My question was -- if you can answer it; if you can't, that's okay -- does salinity affect the food in the marsh that the crabs eat?

THE WITNESS: To the extent that it affects everything in the marsh. It's --

THE COURT: What does it do? Tell me what happens.

THE WITNESS: Well.

THE COURT: If it's 30/40 parts per thousand, is there food for the crab there?

THE WITNESS: That's not uncommon in these soils.

THE COURT: Not in the soils but in the water.

THE WITNESS: Well, the crabs are eating the things, primarily the detritus produced by the plants that are growing in these very saline soils.

THE COURT: Okay.

THE WITNESS: So that is a regular sort of salinity for these types of soils.

THE COURT: So it has the same salinity as the ocean.

THE WITNESS: But it's in the soil; it's not on the surface. And what drives the soil salinity is the evaporation off the surface of the marsh that results in the accumulation in the soils.

MR. MC CARTHY: Your Honor, if I could ask Dr. Davis some questions --

THE COURT: Thank you.

MR. MC CARTHY: -- maybe I can help clarify this.

THE COURT: Thank you.

BY MR. MC CARTHY:

Q Dr. Davis, what I believe the Court is trying to understand is, is it the salinity level in the marsh that attracts the crabs or attracts the food the crabs eat or is it

the water in the marsh? How does the water interact and the salinity as a characteristic of that? Is the salinity controlling for the crabs in the marsh, or is it the fact that the water is there that allows the crabs to enter and leave the marsh as well as the other food sources?

A Well, the water provides the access. It's --

Q How does that work?

A Well, when water levels are high enough, the crabs and fish can move into the marsh. But it's really the attraction to the structure and the detritus, the dead plant matter and the bacteria and invertebrates, that that attracts that is attracting the crabs as a source of food. And that occurs across a very wide range of salinity.

Q During events of connectivity you describe the marsh as being flushed by the waters coming in and out.

A Yes.

Q Does the salinity -- do the salinity levels in the marsh change during those flushing events?

A The salinity in the soil, as I said, can be upwards of two to three times that of sea water. So when you have a period of connection and marsh inundation, you get a flushing of that soil. So regardless of what the bay water is, as long as it's less than what the soil salinity is, the salinity conditions in the soil are going to be reduced, which relaxes those stressful conditions for the plants and makes them typically more

favorable for growth.

THE COURT: Okay. So the bottom line is, it's a more favorable condition the lower the salinity.

BY MR. MC CARTHY:

Q Is that a correct statement, Dr. Davis?

A Only in this case, in combination with inundation that results in the flushing of those soils.

THE COURT: I understand. You said it makes a more favorable environment to flush out the salt out of the soil.

THE WITNESS: Out of the soil, yes.

THE COURT: And it lowers the salinity level in the soil as well as in the water.

THE WITNESS: But the distinction that I'm trying to make here is that it wouldn't matter if the surface water salinity was 20 or 30. It's still going to lower the salinity conditions in the soil, which makes the conditions more favorable for the plants.

THE COURT: Well, when it flushes out the soil, it also flushes out the water.

THE WITNESS: It flushes out primarily the salts --

THE COURT: I mean the fresh water inflow is going to take salt out of the water as well as the soil.

MR. MC CARTHY: Can I make a clarification?

THE COURT: Is that right?

THE WITNESS: Um.

THE COURT: How could it not be?

THE WITNESS: Really any --

MR. MC CARTHY: What he's --

THE WITNESS: -- water of any salinity that's lower than the conditions in the soil are going to flush salts.

THE COURT: Right. And that's good.

THE WITNESS: That is good.

THE COURT: I got it.

BY MR. MC CARTHY:

Q But, Dr. Davis, let me clarify. Does the marsh get inundated by fresh water and how would you define -- let me start off:

How would you define "fresh water" versus "saline water"?

A Well, fresh water is, in the context of wetlands, is less than a half part per thousand. So these marshes if they were exposed to fresh water for a period of time, again, considering that the vegetation is the way that you read the marsh, the vegetation would resemble that of a fresh water marsh. It wouldn't be a salt marsh. The reason why we have wolfberry and these other plants out there is because it's a salt marsh. And soil salinities get very high and that eliminates other plants from coming into that marsh and taking over.

Q So if fresh water were inundating the marsh these marshes would not exist; is that correct?

A For an extended period, yes.
Q Okay. So as you use the term "fresh water" in the flushing event, you're talking about an event where the bowl that is the pond, which has now -- have concentrated salts due to evaporation, is flushed out taking those concentrated salts out and reducing the salinity; is that correct?
A It's water of lower salinity that would --
THE COURT: He's talking just the connectivity.
THE WITNESS: Yeah.
THE COURT: If it reconnects with the rest of the water, then the salinity drops, right?
MR. MC CARTHY: Based upon the salinity in the bay --
THE COURT: It doesn't have to be fresh water. It can just --
THE WITNESS: That's right.
THE COURT: -- be the reconnecting.
THE WITNESS: Water of lower salinity relative to the salinity of the soils.
BY MR. MC CARTHY:
Q And it's taking out the more concentrated salts due to evaporation --
THE COURT: I think we've all got it.
BY MR. MC CARTHY:
Q -- during the period of disconnectivity.
A Yes.

MR. MC CARTHY: Thank you, your Honor.

THE COURT: Maybe.

MR. MC CARTHY: I just want to take advantage of Dr. Davis' knowledge here.

BY MR. MC CARTHY:

Q Dr. Davis, do the inflows from the river affect the connectivity events in the marsh, in your opinion?

A No.

Q And why is that?

A Well, the inflows to the estuary from the Guadalupe River in concept would need to be higher than the outflows at the tidal passes, Pasca Bayou (phonetic) and Aransas Pass. And that volume is pretty large at those passes, and the rate at which you normally have inflows into the system is not enough to allow water to pile up in the system.

And we've looked at this during our period of study in focusing on both the marsh and in the bays, and we found that when inflows were less than 10,000 cfs there was just a scatter between inflows and bay water levels. What we did find was that in the really high inflow event of late 2004 where we had inflows over 110, 120 thousand acre feet per week, we did see what appeared to be a relationship where bay water levels were rising at those higher inflow rates. But that was just during that period of study.

MR. MC CARTHY: Could we go back to Exhibit DX399,

please?

Q Dr. Davis, in connection with these three areas that you had some focused study on in the San Antonio Bay area you, I believe, testified you did water level monitoring?

A Yes.

Q Okay. And you did that using data available from the TCOON system; is that correct?

A Well, at these three sites we established our own water level devices so that we could then relate water level fluctuations in these tidal creeks to the TCOON station out in San Antonio Bay.

MR. MC CARTHY: Could we put up Exhibit DX402, please?

Q Reference to the top photograph, Dr. Davis. Is this one of the water level recorders that you're talking about?

A Yes. This is one of three platforms that we established along the three tidal creeks. And the water level recording device is the upright pipe. There's a sensor in here that goes all the way down into the water. This was a sampler for surface water that allowed us to look at nutrients and other quality parameters.

And then down here, (indicating), is one of the isolated ponds where we had a paired water level recorder, if you will, that we then would compare with the adjacent tidal creek water level recorder.

Q Okay. And with respect to the water levels in the tidal creek you had three of those installed; is that correct?
A Yes. So we basically had three pairs of creek pond water level recording sites.

MR. MC CARTHY: Could you put up Exhibit DX403, please?

Q Dr. Davis, could you please describe Exhibit DX403 for the Court and what it is?
A What we have here are two plots of water level data from the three sites. This bottom panel -- and this is over time from late June 2003 to June of 2004, July of 2004. The different colors represent the three different sites. And I realize there's a lot of noise in the data, but this is what you actually find if you go out there and measure water level. These are, in some sense, they're tidal fluctuations; in some sense, there's wind effects. There are all kinds of factors that contribute to the movement of water that affects water level in these tidal creeks.

This top panel are the paired water level recording devices that we had in the nearby ponds. And in some cases, particularly for the Pump Canal site and the Boat Ramp Creek site, we had devices in ponds that were less than 100 yards away. So these were isolated ponds that were very near the tidal creeks.

I would like to walk you through this if I could just

to point out some of the dynamics that we see in the system. And if we just focus on the bottom panel here, what we find in this first area, this very large spike was from Hurricane Claudette. And this was a storm that came ashore as a Category One or slightly less. And you can see what a storm can do to water levels in this part of the bay.

This corresponding spike up here, (indicating), means that water levels were high enough that we filled the ponds. The ponds responded in kind with this large spike. But look what happened shortly after Hurricane Claudette. We see water levels in the creek dropping and fluctuating. This is regular tidal inundation. There's -- that's the bay right here, (indicating); whereas the ponds show this gradual decline to the point where they just bottom out. And this is a period of dry down. So we can look at this and see a spike, which indicates a connection or a filling, and then this subsequent decline indicates that they're drying down.

If we move on into this, (indicating), period, which is summer-early fall, we can see there's tidal fluctuations; sometimes water levels get low. There's a connection event and then you can see this, (indicating), almost a flat line, it starts to dry down. And then they bump up again and then they start to dry down. And so water levels get high enough to where there's a sustained connection between the creeks and the ponds. And you can see that right here, (indicating).

As we move into the winter period, this is the period when the whooping cranes are at Aransas National Wildlife Refuge and around the San Antonio Bay system. We see these large fluctuations, spikes, and then a period of decline, spike, and then a period of decline. And we see that in the pond data again. We see a spike, which indicates a connection; and then kind of a flat line, where it's dropping down, and then it spikes again. This is on about a two-week interval. And this is largely attributed to the spring tides that are associated with full and new moons.

Some of these are also driven by frontal passages that we know have a significant effect on water movement in this system. And this period right here, (indicating), where there's a lot of noise, a lot of fluctuation in the ponds, indicates that that was probably a frontal passage.

So this is typical of what we see in the winter where there's a connection event and then two weeks or more without a connection, and then a connection and then a few weeks without connection. So that's a really important feature of the wintering season for the whooping cranes.

MR. MC CARTHY: Could you please put up DX404?

Q Now, Dr. Davis, you testified earlier about doing your water monitor leveling -- level monitoring in the creeks and then tying that to the gauge for the tides at Seadrift.

Could you please explain this graph to the Court and

how that worked in your investigations?

A Sure. So if we again just focus on the tidal creeks, because these are the ones that have water all the time, we wanted to relate what we are seeing in the tidal creeks -- these are water levels in the tidal creeks -- to the TCOON gauge at Seadrift. And the reason for this is that if we had a strong enough relationship, then we can hindcast and forecast using this longer period of record at Seadrift to predict what's going on in the tidal creeks at Aransas Refuge that we focused on.

And as you can see here, at all three sites we found what I would consider to be a pretty good relationship given that these sites are several miles away from Seadrift. We explain about 75 upwards of 80 percent of the variability in water level data at these tidal creek sites just by using water level at Seadrift. So the advantage of this, again, is just that we can now use Seadrift to estimate what's going on in the marshes at Aransas. So it becomes an important reference gauge for us.

Q And based upon this work did you reach any conclusions with respect to what causes the changes in water elevations in the marshes?

A Well, and then coupling what we have here with the -- our understanding of the relationship between the tidal creek and its adjacent isolated pond, now we can use Seadrift to estimate

connections or connectivity in the marsh at Aransas.

MR. MC CARTHY: Could you please put up Exhibit DX405?

Q Dr. Davis, is this a graphic that you prepared?

A Yes, it is. And again, these are just using TCOON water level data. And these are what are called box and whisker plots. And what they allow you to show is a visual depiction of the distribution of data of a given parameter.

And here we have TCOON water level data for the entire period of record across months. This is January all the way through December. And these boxes just represent the interquartile range of data. So about 75 percent of the data falls within these boxes. These whiskers represent the spread, so the min and max, if you will, of those data.

So by looking at the boxes you get a really good understanding of how water level in San Antonio Bay varies across months in a given year. And statistically these letters just represent significant differences using analysis of variance to compare the means of these -- or the variance in these different boxes. The different letters indicate significant differences.

And just to point out what this shows, the months of January, December and to some extent February and November, these are the lowest water periods of the year in San Antonio Bay; whereas, the highest water periods are typically

September, October. And again, the letters serve as sort of an ordering of how these different months rank.

And again, this is all the water level data I believe going back to maybe 1995 from the TCOON site at Seadrift. This lower --

Q Doctor, if I could just stop you for a second.

In the top graph at .05, I believe it is, you have a line going across as a reference. Could you please elaborate on that?

A Zero point five, this is just a depiction of the grand means, so of all of these water level data that's the grand mean. And so the position of the box and, in particular, that middle line, which is the middle of the distribution, if you can just compare that to the overall average of the system, and you can get also another depiction of how water levels fall in that particular month relative to the overall mean.

Q Okay. And this top graph represents the entire period of record for the monitoring --

A Broken down by month, yes.

Q Okay. And would you explain, then the lower graph that is a different time period, correct?

A This is using, essentially, the same period of the data. But what I did was I broke down the data by winter. And my designation of the crane winter is from October 15th through the following April 15th, which roughly coincides when the

cranes are there.

And so these are crane wintering periods along the X axis, and this is going from, I believe, 1996, 1997, all the way through to 2010, 2011.

And again, the letters represent significant differences between these. And so again to give you an idea, the letters D and E means that things that have an E are not significantly different; or if they have a D, they're not significantly different. But something like A, B, C here is going to be significantly higher when you compare where that line falls relative to the mean compared to this one in 2010 and 2011.

So the lowest winter periods that we found just in terms of water level distributions were things like 2010, 2011, 2008, 2009, 2005, 2006 here, as opposed to winters like this, (indicating), one AB, 2003, 2004 and some of the others.

Q Okay. And on this graph the line at approximately 0.43, 44 is what?

A That, again, is the grand mean. But because we know water levels are lower in the winter time in this period and considering that these are all winter data or what we call the crane winter, that number is a little bit lower relative to this grand mean that includes data from all across the entire year.

Q Okay. And for the period of 2008, 2009 how would you

characterize the water levels?
A Again, compared -- if we just used the letters as an indication, and relative to that average you can see that it's quite a bit lower than certainly those that are closer to that middle line and those that are above.
Q Okay. And that follows a period of about four years of low water levels based on what's on the graph; is that correct?
A There actually, yes. So we have -- what we found in 2008, 2009 is that this is on the heels of a period of four winters of below-average water level in this system.
Q In addition to the tidal influences in these connectivity events and the water levels and the isolated ponds, are there other factors that influence the water levels in the ponds?
A Well, direct rainfall is certainly important. And we had a few events during our period where we had a couple of large rainfall events on the order of a few inches in a day. And that's certainly enough to put water back into these systems and other areas. Particularly near the boat ramp we observed during our period of study quite a bit of runoff from the adjacent uplands into that area of the marsh.
Q What about temperature?
A Well, temperature is certainly important. It's not a source of water, but in summer times it's typically more of a sync because that increases the evaporative potential off of the pond surface and results in a more rapid decline of water

levels.

Q Okay.

MR. MC CARTHY: Could you please put up Defendant Exhibit 406, please?

Q Dr. Davis, you testified with respect to the effects of evaporation on the isolated ponds.

Could you please describe these photos for the Court?

A These just -- both of these photos are during low water periods, so there's not a connection of water across the surface of the marsh. And, in fact, it's a period of extended disconnection; because not only do we have very clear cracking of the surface soils but -- and these photos don't show it quite well, but you can actually see salt crust accumulation in some areas, which indicates a large evaporation. And the salts are left behind when water evaporates.

Some other indications looking at this photo here, as we start to get a real greenish color to the water. And this is typical when the ponds dry down; you get blooms of algae and other things that are basically the only things that are able to persist under those really harsh conditions as the water gets really saline and there's a lot of accumulation of nutrients because the water is evaporating. So it's just another indication that the water levels have been low for quite some time.

Q Dr. Davis, your graph that was up earlier, am I correct

that the events of connectivity vary from month to month throughout the year?

A There is very clear seasonal differences in connectivity. And we typically find that the lowest degree of connectivity is during the winter months.

Q And what events help cause those events of disconnectivity, in your experience?

A Well, for one we have the passages of cold fronts that result in water blowing out of the system. We know that that water rebounds and comes back into the marsh, but there's a period of time where when the northwest winds blow along the Texas coast it will blow water out of the marshes.

It also just seems to be a low water period in that region of the Gulf of Mexico. And part of that is attributable to the thermal properties of water where when it's cooler it tends to be more contracted, when it's warmer it expands. So regional Gulf water levels vary according to those properties.

Q Climatologically from year to year are there differences in -- I mean could you have a period, say a winter period one year which was a dry period and then the next year be a wet period?

A Well, as the previous graphic showed, there is variability in distributions of water level from winter to winter. And part of that may be attributable to the number and intensity of cold front passages. It may just be due to something more

regional in the Gulf of Mexico.

MR. MC CARTHY: Could you put up Exhibit DX407, please?

Q Dr. Davis, I'd like to point out -- I'd like for you to describe these photos to the Court, but I'd like to point out that both these photos are from an October time period but a year apart.

Could you please explain to the Court what these represent?

A Yes. Well, here I believe this is our Sun Down Bay site. You can see the boat there in the background. There's a spoil island there on the horizon. But here you can see in the marsh water levels are quite high. In fact, this would probably be water in the marsh up to my shin. This is -- I believe it's the same marsh near Sun Down Bay, and you can see that the marsh is quite dry. There's a wolfberry plant right here, (indicating), in the foreground; and you can't quite see it, but there are some berries on there.

And so here's, roughly, the same period of time of year but it's a different year; and this is a really dry period. In fact, you can see the soils are very dry, cracked, indicating that it's been -- the water levels have been low for quite some time.

MR. MC CARTHY: Could you please put up DX408? Thank you.

Q Dr. Davis, could you please describe these photos for the Court? And I apologize again on the big screen they're a little more difficult to see; but, in particular, the reference of the rip raft in the back of both photos.

A Yes. So here is the -- we just called it the concrete curtain. And they've laid that across the edge of the marsh along part of Aransas Refuge to control for erosion here. This is, roughly, the same area, perhaps a different crane territory, but roughly the same area. Here you can see a very low water period where the curtain is completely exposed. In fact, part of the near shore zone is completely exposed. And there's no plants here indicating that this area is usually under water.

And what you can't see in this image is that there are two cranes way back on the horizon. They just appear as white specks. And this is typically what we saw. When water levels were high, cranes were in the marsh. When water levels were extremely low, they would go to water bodies that are more permanently flooded, permanently connected, as shown in this image here.

Q And that image, the lower image, that's -- what water body is that?

A This is actually San Antonio Bay. So this is the adjacent bay near the Gulf Intracoastal Waterway.

MR. MC CARTHY: Could you please put up Defense

Exhibit 409, please?

Q And this is just one last series of photos I'd like for you to describe for the Court. We've been talking about crabs and the use of the marshes, habitat, and protection and food sources.

Can you describe these photos, please?

A Sure. These are just two images of crabs that were taken in the marsh. And you can see the succulent plants here. These are plants that you find in these high-marsh areas. And this is what we would commonly see when the marsh was inundated. You would step, step, see a crab. And they would just be hidden down in sort of the vegetation matrix, because that's ideal habitat for them.

Q Dr. Davis, I'd like to change subjects now in connection with your testimony.

You were also on direct and cross, reference was made to you as the person who as part of the SAGES study looked at wolfberries?

A Yes.

Q Or one of the persons who looked at wolfberries; is that correct?

A Yes. My students and I focused on the vegetation community, particularly the wolfberry.

Q Okay. Could you please describe for the Court the habitat conditions that wolfberries are found in?

A Sure. First I'd like to say that this is an interesting group of plants. It's related to the tomato, so it produces the little orange berry that the wolfberry produces. It's effectively a little tomato. The technical name for the genus is lycium. And you can find lycium in some really varied locations. Even in the United States you find them -- I've seen them on mountain tops in the Arizona desert. I've seen them in fields, very arid fields in west Texas. I've seen them in hypersaline marshes in Tijuana Estuary in southern California.

This is a plant that grows in saline soils. And that is the common feature among lycium plants is that they like saline soils. And so when you see them in this type of marsh, it's obviously an indication that this is a salt marsh. And when they do grow along the coast it's in high marsh areas.

THE COURT: So you don't have to salt the tomatoes; they're all --

THE WITNESS: That's a good point.

THE COURT: They're all done.

BY MR. MC CARTHY:

Q Dr. Davis, during the course of these proceedings we had testimony about observations of wolfberry plants that had lost their leaves.

Could you please describe your experience with what it means when you see a wolfberry plant that's lost its leaves

and --

A Sure. And that is another common feature of these kinds of plants that grow in saline environments. And what we found during our period of study is that they would leave their leaves every summer. This is the period of time when soil salinities are very high. It's a period of time when the light intensity is incredible. It's a period of time when temperatures are very high. And so the way they conserve what water they have remaining when conditions get to their most extreme with temperatures, salinity in the soils and so on, they will lose their leaves. And we saw this every summer that we looked at them.

And with their life cycle when the high water levels would return in the late summer, early fall, the soils would be flushed, we would find that the wolfberries would start up leaf production. And so plants that you didn't even know were wolfberries, plants that you thought were just a stick in the ground, all of a sudden they have all these leaves and they're putting out flowers, and by the time the cranes arrive there's fruit.

Q And this is a result of events of connectivity?

A Those were largely the result of inundation of the marsh and release of those saline soil conditions.

Q Okay. What about direct rainfall events? You testified about those earlier. How do they affect the wolfberries?

A Rainfall is very important. And we drew from our understanding of the literature from Dr. Ken Dunton at UT Marine Science Institute, who's also worked with this same type of plant community, who found that -- he and his graduate student found that rainfall events could be linked directly to the production of leaves in the late summer, early fall. That was also a contributing factor to the release of that stress that I described earlier.

Q Late summer or early fall --

A Late summer or early fall rains that would freshen up the soil conditions a little bit to the point where those plants weren't as stressed and then can then produce fruit in the fall.

THE COURT: And that's fresh water.

THE WITNESS: Rainfall, yes.

THE COURT: Okay. Could inflows from the river do the same thing?

THE WITNESS: In that part of the system we never measured fresh water. It was variations in salinity in the tidal creeks depending on conditions within the bay.

THE COURT: So you didn't have any way to measure fresh water inflows?

THE WITNESS: We tracked fresh water inflows just using gauge data.

THE COURT: Okay.

BY MR. MC CARTHY:

Q Dr. Davis, did you observe the wolfberries at the three sites, Pump Canal and Sun Down Bay and -- what was the third site? I'm sorry.

A Boat Ramp.

Q Boat Ramp.

A Yes, all three sites.

Q And can you -- was there anything unique in your observations regarding the wolfberries at these three sites you'd like to share with the Court?

A Well, so we established three plots at each of these three sites. And initially we had over 250 wolfberry plants that we were tracking in total. And I think that number grew to well over 350 towards the end of the study. And they were distributed fairly evenly across those three sites. Some plots would have a few more than others, but the spread of plant number was pretty even across.

What we typically found was that the site furthest down the peninsula, furthest from, you know, the river when we were considering it -- this is Sun Down Bay -- it typically produced the most wolfberry fruits of the three sites that we looked at. And that was consistently from year to year.

Q It had the greatest abundance of production?

A Greatest number of berries per plant. And that was our way of normalizing the data so that we could control for the

number of plants that were in a given plot. So we focused on number of berries per plant.

Q With respect to your testimony about connectivity and the flushing of the marshes, were there any distinct features between Sun Down Bay and the other two sites that you observed?

A Yeah. In the very first image I could have pointed this out, but the --

Q Dr. Davis, hold on.

MR. MC CARTHY: Could we please put back up Defendant Exhibit 399?

A This is the site I was referring to that typically produced more berries per plant. This is the furthest down the peninsula. The river is going to be well off to the northeast. And this site -- and you can see it somewhat from the image. I don't want to interpret too much from this. But this site we found was typically lower in elevation. It connected more frequently than these other two sites because it had -- the soils were slightly lower in elevation. And you can see that somewhat from this image right here, (indicating). There's more water on the surface than there is at these other two sites.

These two sites made up what we considered to be the bulk of the marsh at Aransas Refuge, so they characterize the bulk of it; whereas, this marsh down here, (indicating), along this edge seemed to be typically lower in elevation; and,

therefore, would be more connected. And it was my conclusion that one of the contributing factors for there being more berries per plant in this area was that this site was inundated more frequently, connected more frequently.

Q Dr. Davis, I want to explore one other area with you. With respect to Sun Down Bay and your testimony just now about it being at a lower elevation, as part of your report you made some conclusions or made some observations, I'll say, that you focused on the other two sites and did not describe Sun Down Bay in that discussion.

Could you please explain why you didn't include Sun Down Bay?

A Well, there are a couple of factors. And I guess we haven't gotten to that particular figure yet. But in my estimation these two sites are characteristic of the bulk of the marsh along Aransas National Wildlife Refuge. This site here, (indicating), I wouldn't consider it an outlier. It's just a lower area of the marsh relative to these other two.

Q Okay. So with respect to your observations and the graphs you showed earlier, the effects, the characteristics and the curves would be the same across the three of them?

A Can you repeat that?

Q Is there any distinction between the two sites and Sun Down Bay with respect to your conclusions related to salinity or connectivity in flushing events?

A Well, I would just say that in our studies we saw that this site was inundated, connected a few more days out of the winter than these other two sites. It had what we calculated to be a different threshold of connection. It was slightly lower. So when water levels would rise, this site would be connected before these other two sites. But we saw the same assemblage of plants, same type of marsh other than what I'm describing.

Q Let me go back to crabs very briefly.

With respect to the size and, say, age in the life cycle or stage in the life cycle where you would you find crabs, would you expect to find the crabs in the marsh to all be of the same size or of different sizes in different stages in their life?

A Well, we found all sizes of crabs. I didn't actually go out and sample crabs in the ponds for this particular study. But we would see all sizes and even different species of crabs, not only in the marsh but also in the ponds.

Q And the key to the crabs getting into the marsh has to do -- requires an event of connectivity, correct?

A Well, that's the case for all these aquatic animals for them to get from the bay, from the tidal creeks, into the marsh and into these ponds. Our observations that these ponds are isolated, for the most part, the only way for them to get in is when water levels are high enough to allow for that access.

Q Dr. Davis, is it your opinion that the controlling characteristic with respect to the marsh is not salinity but is the tides and the water level influences?

A This far away from the river the inundation is probably the driver of most of these processes in the marsh. Not only does it provide access but it also controls conditions for the plants and so on.

MR. MC CARTHY: Thank you, your Honor. At this time I'll pass the witness.

THE COURT: Thank you.

(Pause)

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Good morning, Dr. Davis.

A Good morning.

Q I have a number of questions for you. I want to start off with something that you started off with with regard to the involvement of the peer review team.

Excuse me. I need to get my water.

(Pause)

Now, did I understand you to say that the peer review team was actively involved in helping you select the sites?

MR. BLACKBURN: And if I could have the first of the diagrams, the one with the three plots on it, which I have lost track of.

(Pause)

Well, I'm sorry.

Q You have a map that has three sites on it that you identified, and those three sites you said were selected with the assistance of the peer review committee? Is that what your testimony was?

A No. They were selected with the assistance of Dr. Felipe Chavez-Ramirez and Tom Stehn.

Q Oh.

THE COURT: It's 400. Do you have it --

MR. BLACKBURN: Yeah, he found it.

MR. WAITES: I show 399.

THE COURT: Thank you.

MR. BLACKBURN: That's the one.

BY MR. BLACKBURN:

Q And do you recall in your deposition when I asked:

"Did you send out a letter or some form of communication to the peer review committee saying it is my plan to place various observation platforms and field data collection systems in the field? Here is where I plan to place them, and here is what I plan to do to collect for the following purposes."

And your answer was:

"I believe those sites were established before we formalized the peer review committee."

A Yes, that's correct.
Q And you go on to say on your deposition that the marsh sites were selected by your project sponsors or in consultation with the project sponsors, correct?
A No. I don't recall saying that.
Q And I'm referring to Page 46, line 10:

"QUESTION: And am I correct that you said that the peer review group was not constituted before you established your field locations? Is that right?"

"That's correct" is your answer.

"Did you meet with SARA, SAWS and GBR personnel before you established your field --

"Okay. We met with them before we established those locations."

A We had several meetings with them before we began field studies, but there wasn't any consultation with them with regard to the location of sampling sites.
Q And it's your testimony that you met with Felipe Chavez-Ramirez as part of the peer review team prior to selecting those sites.
A We had not formalized the peer review team at that time. We recognized Felipe Chavez-Ramirez and Tom Stehn as experts in the layout of the marsh. They understood the geography of the marsh, where the birds are relative to where we would be sampling. So we consulted with them.

THE COURT: And your sponsors were who for the project?

THE WITNESS: The project sponsors for SAGES were the San Antonio River Authority, Guadalupe-Blanco River Authority and San Antonio Water System.

BY MR. BLACKBURN:

Q Now, do you agree with me that in your deposition you said you weren't an expert on whooping cranes?

A That is correct.

Q And that you said you weren't an expert in hydrologic modeling.

A That is correct.

Q And that you weren't an expert in blue crab abundance.

A In blue crab abundance, that is correct.

Q Now, in your expert report you presented a table that related all of this water level information, or at least some of your water level information, to whooping crane mortality. But you didn't present any of that today, correct?

A That is correct.

MR. BLACKBURN: Could I have Plaintiff's Exhibit 10?

Q Now, you have raised an implication that there is a relationship between essentially suitability of territories and these wind driven events where the water moves out of the bay, correct?

A That's correct.

Q And is it your testimony to this judge that that's in any way related to whooping crane mortality or not?
A Can you repeat that?
Q Right. I mean why are you telling us this information about the tide? Are you just informing us generally about the status of the bay system and how the marsh works, or is it the -- or are you intending to imply some connection with something related to whooping crane mortality?
A There is -- the whooping cranes are a part of this ecosystem. And in order to understand whooping cranes you need to understand the marsh ecosystem.

THE COURT: Okay.

THE WITNESS: I'm here to provide an understanding of what drives the marsh ecosystem.

BY MR. BLACKBURN:

Q But you're offering no testimony today that your testimony is related to whooping crane mortality in any way.
A I'm -- again, I'm here talking about the marsh ecosystem and the drivers of the marsh ecosystem.
Q Now --

THE COURT: I didn't hear anything about the mortality rates of whooping cranes.

MR. BLACKBURN: Okay. I just wanted to clarify that, because his expert report had a lot of that and --

THE COURT: I know that. Move on.

BY MR. BLACKBURN:

Q Now, would you mark for me on this map -- this is Plaintiff's Exhibit 11. And I think you can actually use your finger to mark the approximate location of your sampling sites.

A Oh.

Q Wrong location?

A Well, it's closer to the edge. So there's a site there, (indicating), a site there, (indicating), and then one roughly right there, (indicating).

THE COURT: I'm missing the points.

BY MR. BLACKBURN:

Q Can you make them a little larger?

THE COURT: Got it. Okay, I see.

MR. BLACKBURN: So there's three sites there.

THE COURT: Thank you.

BY MR. BLACKBURN:

Q Now, when you measured bay levels those were the three sites that you utilized, right? I mean when you measured marsh levels, sorry.

A Tidal creek and marsh levels at those three sites. The Seadrift site is, roughly, up there, (indicating).

Q And you're making a connection between that site and those marsh levels, right?

A Yes.

Q Now, there's a lot of whooping crane territory on the

south side. There's a lot of Aransas marsh on the south side, right?

A My understanding was the Aransas National Wildlife Refuge marsh encompasses this area here, (indicating), and that this other area across the bay was Matagorda.

Q And my question is: Do you have any recording devices or did you collect any data from the south side?

A No.

Q Now...

(Pause)

MR. BLACKBURN: Could I have Defendant's Exhibit 292, please?

THE WITNESS: I'm not sure how to erase this.

THE COURT: I've got it.

MR. BLACKBURN: I think I -- I had assistance.

THE COURT: Oh, you taught them. Thank you.

MR. BLACKBURN: Well, some of us. Would you -- this is an exhibit from Dr. Ward's testimony. Could you hone in on the bottom right, the bottom section of that? Ooh, a little burry but...

BY MR. BLACKBURN:

Q Dr. Ward was describing that when a cold front came in the water tipped toward the island. Do you agree with that?

A Could you rephrase that question?

Q Sure.

MR. BLACKBURN: Back off again.

Q The illustration shows, basically, prevailing winds coming in across the coast. When a cold front approaches, the winds probably speed up a bit and it sort of tips the water toward the inland side. And then when the cold front passes, it puts the water back toward the island side.

A Yes.

Q Do you agree with that?

A Yes.

Q So at the time that you're recording water levels dropping on the south side they would be rising on the -- dropping on the north side they would be rising on the south side, right?

A At a point in time, yes, that's correct.

Q But your data -- you have no data about that.

A The data that we have would be the rebound of the water coming back towards the marsh and away from the marsh where it was piling up against that we're not measuring.

Q But what you were describing was what happened on the north side, not what happened on the south side.

A That's correct.

MR. BLACKBURN: And could we go back to Plaintiff's Exhibit 10?

THE COURT: So your point is the water didn't go away.

MR. BLACKBURN: I'm sorry?

THE COURT: Your point is the water doesn't go away.

MR. BLACKBURN: The water doesn't go away and, basically, there's a whole part of this ecosystem that he's not monitoring.

THE COURT: I got it.

BY MR. BLACKBURN:

Q And would you agree that the bulk of the whooping crane territories are outside of the areas that you've monitored?

A Based on this map it looks as though there are more that are not on Aransas Refuge.

THE COURT: Time to break?

MR. BLACKBURN: Sure, that would be great. Thank you.

THE COURT: Okay.

(A recess was taken from 9:58 a.m. to 10:14 a.m.; parties present)

MR. BLACKBURN: Are you ready to proceed, your Honor?

THE COURT: I am.

MR. BLACKBURN: Okay.

CROSS EXAMINATION (CONTINUED)

BY MR. BLACKBURN:

Q Well, we're back, Dr. Davis. I'd like to call up the SAGES report, which is...

MR. WAITES: Defendant's 223.

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BY MR. BLACKBURN:

Q Defendant's Exhibit 223. And I'd like to focus in on just a couple of things to see if we could get some agreement.

Do you agree with the statement from the SAGES report that base salinity can be used as an indicator of marsh salinity?

A I agree that it can be used, absolutely, as an indicator of marsh salinity. It provides a reference condition for when you have inundation, and then the subsequent disconnection that takes place will override whatever that salinity is.

Q Okay. And then the next sentence that follows, there are studies as part of SAGES where you did, I think, laboratory experiments as well as field experiments, correct?

A That is correct.

Q And the results from both field and laboratory experiments indicate that salinity was an important factor in wolfberry fruit production. Do you agree with that statement?

A That is -- yes, I agree with that.

Q Now, I'd like to turn our attention to Page 38 of the SAGES study, which is --

MR. UNIDENTIFIED: Thirty-eight?

MR. BLACKBURN: Thirty-eight.

BY MR. BLACKBURN:

Q And I'd like to ask you about these three passages from the SAGES study. The first is up at the top here:

"Therefore, we considered summer time salinity conditions within the marsh to be important in fruit production, as conditions during this period affect the period of growth leading up to flower and fruit production."

Do you agree with that statement?

A I agree with that. That's a reference to salinity conditions within the soil, the marsh soil, yes.

Q And, in general, years with lower summer time salinity led to increased fall fruit production at all three marsh sites.

Now, that's referring to water salinity, correct?

A This particular statement -- this may be in reference to experimental work that we did.

Q And then -- so is that a "yes" or a "no"?

A I'm not sure. This could be experimental work that we did relative to what we measured in the marsh.

THE COURT: Do you see want to see the whole -- I mean the whole --

THE WITNESS: It might help, yes.

THE COURT: Would you show him the -- somebody give him a copy of Defendant's 223?

MR. BLACKBURN: I think we have a copy, your Honor.

MR. WAITES: Yes.

MR. BLACKBURN: If we could get the whole...

(Pause)

BY MR. BLACKBURN:

Q You're on page -- if you look at that TAP -- or I don't know which one. It's Page 38 of the report, and it's -- at least my version has a TAP number at the bottom. But I'm not sure if that one does or not.

MR. WAITES: Mr. Blackburn, I think it was 38 of the report.

MR. UNIDENTIFIED: I heard --

THE WITNESS: Thirty-eight. I see it here.

MR. UNIDENTIFIED: I heard you say 48.

BY MR. BLACKBURN:

Q And if you'd like to just take a moment and look through that. The section really starts over at 3.222 on Page 37.

(Pause)

A The last paragraph on the previous page refers to the experimental work and I would -- I think this is, again, relating back to the experimental work that we did.

Q Well, let me --

MR. BLACKBURN: I'm sorry, go back to where we were, Patrick.

MR. UNIDENTIFIED: Okay.

MR. BLACKBURN: Page 38. There you go. And zoom in on the top paragraph, please.

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BY MR. BLACKBURN:

Q Actually, I've been reading it -- if you read the first one that's covered:

"Therefore, we considered summer time salinity conditions within the marsh to be important in fruit production, as conditions during this period affect the period of growth leading up to flower and fruit production."

A That's right. This is a description of conditions within the marsh during the summer time where we can have low water levels, extended period of disconnection and marsh exposure that leads to salt accumulation within the soils. That's --

Q And then look at the --

A -- commonly what occurs.

Q But look at the next sentence:

"Our synthesis of data from the macrophyte plots suggests the inter annual fluctuations in mean summer time salinity, June through August, at GBRA One gauge station."

That's out in the bay.

A Yes.

Q "Correlate well with trends in fall wolfberry fruit production."

So that bay -- when you're talking about lower salinity, they're also talking about salinity in the bay being

correlated, correct?
A That's right. And it's that salinity within the bay water when the marsh is inundated, that essentially sets the base line for conditions within the marsh. And as that marsh then becomes disconnected and the water evaporates, that salt will accumulate in the soils and that's what sets the conditions for the wolfberry plants that I described earlier.
Q And the next sentence: "In general, years with lower time salinity -- lower summer time salinity led to increased fall fruit production at all three marsh sites."
That's with reference to GBRA Station One in the bay.
A And that, again, it's also involving the work that we did, the experimental work that we did where we manipulated salinity and looked at the growth response of the wolfberry plant. I just wanted to make clear that this not only involved the field work that we did; it involved experimental work.
Q All suggesting lower salinities are better for wolfberry production, correct?
A This -- again, it does not factor in the inundation component.
Q Understood. Just relating it to salinity.
A This relates it to salinity.
Q Thank you. Let's see. If you go to Page 44 of SAGES, please. And just hone in on that --
THE COURT: Did you ever ask when they meet with the

sponsor what the sponsor asks them to do?

MR. BLACKBURN: I did not.

THE COURT: Can you do that?

MR. BLACKBURN: I'd be happy to.

THE COURT: I mean is that allowable?

BY MR. BLACKBURN:

Q What was the goal of the SAGES work that you did?

A My understanding -- and, again, it's been several years now. But at the time my understanding was that there was a water supply project that was being considered, and there were no studies done on the marsh ecosystem at Aransas, and there was a need to understand how inflows affect the marsh ecosystem at Aransas Refuge. And so we developed a study that considered all aspects of the ecosystem. And what we found that it's more complicated than just relating what goes on at the mouth of the river. There are a lot of other factors that drive the ecosystem. And so our study blossomed to incorporate other aspects that weren't in consideration.

Q So would it be fair to say it was considered -- it was conceived with concern about potential opposition to a project?

A I didn't -- at the time I didn't know that.

Q Okay.

MR. BLACKBURN: So if I could have the exhibit please.

Q And I would just ask you in terms of -- the bulk of your

testimony was about these ponds that were relatively detached from the main canal structure or from the main creek structure; is that correct?

A Yes. There are a limited number of tidal creeks that intersect the marsh at Aransas. There are hundreds of these isolated ponds scattered across the marsh that are always directly connected.

Q Is it true that what you described was what would be identified here at ICP, intermittently connected ponds?

A Yes.

Q And connected ponds are those that are right on the creek system; they're directly connected into the creek system, correct?

A This table is not -- I didn't generate this table, but my interpretation of it would be that you have connected waters. These would be tidal creeks and bays, embayments that cut into the marsh that are always connected through tidal creeks. And then you have intermittently connected ponds.

Q And the intermittently connected ponds that you've identified as being what you studied show up as 2.62 hectares compared to 28.47 hectares of connected ponds with regard to Boat Ramp, correct?

A These are not my data so I can't speak to them but the -- I will say that the connected bays were -- particularly at Boat Ramp there was one very large connected bay that if we looked

at the map would be a significant feature of that landscape. The ponds -- the intermittently connected ponds were smaller and quite numerous.

Q But this is as shown on this chart, which is part of SAGES, correct?

A Correct.

Q And you are a co-author; your name is on the cover of SAGES, correct?

A Correct.

Q This shows that essentially you've been talking about, what, 9 percent of the Boat Ramp area and about a third of the Pump Canal area and, what, 6 percent of Sun Down Bay?

A Without a calculator it's going to be something on that order. But I think the point to make here is that if we were to rank these in terms of importance of habitat, these intermittently connected ponds would be much more important in terms of foraging than the connected waters would. And that's based on Felipe Chavez-Ramirez's work and others that showed that these --

Q So you've going into whooping crane feeding habits then?

A Based on my understanding of the literature.

MR. BLACKBURN: Pass the witness, your Honor.

THE COURT: Thank you. Anything further?

MR. MC CARTHY: I have no further questions, your Honor.

THE COURT: Thank you, sir. You may stand down.

(Witness steps down)

Call your next witness.

MR. FERNANDES: Defendants call Dr. Conroy.

THE CLERK: Please raise your right hand.

MICHAEL CONROY, DEFENDANT'S WITNESS, SWORN

MR. MC CARTHY: Your Honor, before we start with this witness may Dr. Davis be excused to return to Florida at his work --

MR. BLACKBURN: Yes, your Honor.

THE COURT: Yes. You're excused. Thank you.

(Dr. Davis excused)

MR. MC CARTHY: Thank you, your Honor.

MR. FERNANDES: May we proceed?

THE COURT: Please.

DIRECT EXAMINATION

BY MR. FERNANDES:

Q Dr. Conroy, please introduce yourself to the Court.

A Okay. My name is Michael J. Conroy. I'm a senior research scientist at the University of Georgia.

Q Let's look at Defendant's Exhibit 368.

Does Defendant's Exhibit 368 appear to be -- is that a copy of your CV?

A Yes, it is.

Q And if you look at the top half of this CV under the

heading Expertise, could you describe for us what your expertise is?

A Yes. My expertise is in the area of quantitative wildlife biology and management. So that is applying statistical methods and mathematical modeling to analyzing data from population surveys, from marked animals, and other field methods to make conclusions about how animal populations function and how they should be managed.

Q And could you briefly describe for us your educational background?

A Okay. I received my undergraduate degree at Michigan State University in wildlife biology and management. I continued at Michigan State to pursue a master's degree also in wildlife biology and management in doing a thesis on snow shoe hares. I pursued a Ph.D. degree at Virginia Tech University in the forestry program with the biometrics option, which is a statistics option in forestry. And my dissertation involved field work and pine plantations related to wildlife habitat and construction of models to model dynamics of understory vegetation in relation to pine plantation.

Q Let's talk briefly about your employment history.

A Okay.

Q Could you briefly describe what you did at the Fish and Wildlife Service while you were at Patuxent between 1979 and 1986?

A Okay. Well, my first professional employment following graduate school was the Patuxent Wildlife Research Center in Laurel, Maryland, which at the time was with the U.S. Fish and Wildlife Service. It's now with USGS. I was initially hired as a statistician in the biology series primarily involved with the analysis of data from marked animals, mostly band recovery, design and analysis of aerial survey data as well.

Q And could you briefly describe what you did at the Fish and Wildlife Service at the University of Georgia from 1986 to 2009?

A Okay. I applied for a position with the Cooperative Fish and Wildlife Research Unit at the University of Georgia, which again at the time was with the U.S. Fish and Wildlife Service. It's now USGS. I was accepted in that position, and I transferred within the Fish and Wildlife Service to that position in 1986, which is also an adjunct faculty position at the University of Georgia. There I supervised graduate students, conducted research in wildlife population estimation modeling, conducted and supervised field studies into topics of a variety of taxa; and have a taught a number of courses over the years, principally at the graduate level.

Q And could you briefly describe for us what you're doing today?

A Okay. I am a -- I retired from the USGS in 2009 and took a position, a part-time non-tenured track position, with the

University of Georgia as a senior research scientist, which enables me to continue doing much of the same work that I've been doing through my career with the University of Georgia, but now employed by the University supervising graduate students, conducting research into the areas of quantitative analysis of wildlife populations and application of decision making models to solving problems in fish and wildlife biology.

Q Let's talk briefly about your publications. The first publication here is a book that you wrote called the Williams -- it's the *Williams Nichols Conroy* it's generally referred to.

What is the subject matter of this book?

A This book is a comprehensive synthesis of quantitative methods in wildlife and fisheries biology dealing with modeling with analysis of population survey data with population data from marked animals and other methods and the applications of these methods to decision making.

Q Now, is the *Williams Nichols Convoy* book the standard reference in this area?

A It is broadly considered to be -- widely considered to be the standard reference, yes.

Q Let's look at the monographs.

A Okay. This monograph, which I also did in 2002, is a synthesis at the time of all of the information on population dynamics for the American black ducks, which includes -- which

included a comprehensive analysis of population factors and integration of data from surveys from band recovery analysis, from harvest data and other sources into a empirical model of black duck population dynamics, which is currently being used to conduct adaptive harvest management for American black ducks by the U.S. Fish and Wildlife Service.

Q And is that a peer reviewed publication?

A It is.

Q Let's look at -- briefly at just a couple of chapters from some books.

What was the focus of this chapter?

A Right. This chapter had to do with analysis of marked individuals and trying to make conclusions about the relationship between their habitat use and survival rates based on that sort of data.

Q Okay. Let's look real briefly at some of the journal articles that you've written. And I believe I counted 86 journal articles. Does that sound about right?

A That sounds pretty close, yes.

Q And are all of your journal articles peer reviewed?

A Yes, they are. They were.

Q Briefly, could you describe for us the subject matter of some of those articles?

A Sure. Well, one of the areas has to do with the development of statistical methods having to do with the

analysis of marked individuals; also, the development and evaluation of aerial survey methods for wildlife populations. And then there were some other articles that had more to do with applications of these methods to field data collection and solving particular local problems.

Q Let's look at real quickly papers and published proceedings.

A Okay.

Q Real generally, what are the subject matters covered in some of these papers?

A Largely the same areas, evaluation of various methods. There's some review papers here that review methods across the board; for instance, in conducting monitoring surveys. And there's some more recent papers that principally have to do with the field of decision making in adaptive management.

Q Let's look at the Courses Taught heading.

Could you describe for us the subject matter of this course that you teach?

A Right. This is a graduate level course that I have taught since 1987. It currently -- actually, to correct this slightly, I'm teaching it every other year. This is taught from the Williams, et al 2002 book, and it is a complete coverage of modeling estimation methods applied to fish and wildlife populations.

Q And if you go down there, there's some shop courses and

workshops?
A Right.
Q Can you briefly describe the subject matter of some of these courses and workshops that you've taught?
A Okay. Well, they fall in a couple of areas. One area would be to -- of training workshops directed at communicating statistical methods and appropriate monitoring methods to agency and NGO personnel and also some workshops directed at decision-making methods and adaptive management. And some of these were to international audiences in Europe and Latin America and places like that.
Q Let's look at that heading, Other. And can you briefly describe what's listed in your CV under that category Other?
A Sure. This is basically a sort of catch-all for professional service in -- for instance, serving as a scientific chair for various international conferences, serving as a editor for journals. I currently serve as the associate editor for three international journals; and also service on advisory scientific teams on a variety of problems, including the Florida panther manatees, Alabama beach mouse and some other ones.
Q Let's talk briefly about some of your students.
A Okay.
Q Are these the graduate students that you supervise?
A Actually, these students have finished. This is already a

little bit out of date. The three students here have all completed their dissertations, and in two cases also a master's degree in statistics, and are now employed, one by the North Dakota State -- sorry -- University of North Dakota as a professor and two as post-doc, one for North Carolina State University and the other one for USGS.

Q And do you have some grad students that you're supervising today?

A Yes. At the moment I either directly supervise or co-supervise five Ph.D. level students.

MR. FERNANDES: Your Honor, at this time we offer Dr. Conroy as an expert on statistical sampling, on population estimation and modeling, including aerial surveys.

MR. MUNDY: Your Honor, I do object with respect -- well, no disrespect to Dr. Conroy in any way, I assure you, sir. But with respect to the ultimate opinions which they will seek to elicit from him regarding or opining on Mr. Stehn and Dr. Chavez's census methods, I don't believe he meets the *Daubert* factors for experience in the relevant issue before the Court. However, I do believe *Daubert* in a bench trial is more of a guideline rather than a -- it goes to the weight, not admissibility. So I would ask the Court to carry this issue along until the conclusion of the testimony.

MR. FERNANDES: I'm sorry. My response is we had a deadline to do *Daubert* motions. We filed all our motions

consistent with that. I don't believe there was any motion filed by TAP's counsel.

THE COURT: Go ahead.

BY MR. FERNANDES:

Q Do you currently have contracts with the Fish and Wildlife Service?

A I do as a consultant.

Q Please describe the work that you're currently doing for the Fish and Wildlife Service.

A Okay. I currently have two contracts with the U.S. Fish and Wildlife Service as a consultant. One of them is a contract that deals with the evaluation and analysis of aerial surveys for desert bighorn sheep in the state of Arizona. The other -- and also that contract also deals secondarily with some population viability analysis work that I'm conducting on the Sonoran pronghorn antelope, also in Arizona.

The other contract I have is a contract to analyze data that were collected by various entities on secretive marsh birds in the Gulf of Mexico in connection with the Deepwater Horizon oil spill.

Q Did the Fish and Wildlife Service ask you to evaluate Mr. Stehn's aerial surveys?

A They did.

Q And who at the Fish and Wildlife Service asked you to evaluate Mr. Stehn's aerial surveys?

A Dr. Grant Harris, who is with the Albuquerque regional office of the U.S. Fish and Wildlife Service.
Q Now, prior to this case had you ever evaluated an aerial survey involving the whooping crane?
A No.
Q Did you agree to evaluate Mr. Stehn's aerial surveys for the Fish and Wildlife Service?
A I did.
Q Now, shortly after you agreed to evaluate Mr. Stehn's aerial surveys for the Fish and Wildlife Service did GBRA then approach you and ask you to evaluate Mr. Stehn's aerial surveys as well?
A Yes.
Q Did you inform GBRA that Fish and Wildlife -- the Fish and Wildlife Service, had asked you to evaluate Mr. Stehn's surveys?
A Yes, I did.
Q Did you inform the Fish and Wildlife Service that GBRA had asked you to serve as an expert witness in this case?
A Yes, I did.
Q Did either the Fish and Wildlife Service or GBRA object to you providing services to the other?
A No.
THE COURT: So you get paid by both of them to do the same thing?

THE WITNESS: Not in this matter, no. I'm not paid by Fish and Wildlife Service to provide advice, your Honor, on the whooping crane matter.

THE COURT: Okay. So you did not end up evaluating Mr. Stehn's aerial surveys for U.S. Fish and Wildlife.

THE WITNESS: I did but as a professional courtesy to the Fish and Wildlife Service, not on a contract.

THE COURT: So you didn't get paid by them for that.

THE WITNESS: Correct.

THE COURT: Okay.

BY MR. FERNANDES:

Q Did you go to the refuge and meet with Mr. Stehn?

A Yes, I did.

Q And what was the purpose of that meeting?

A There were -- the primary purpose of the meeting was to get background information on the details of the aerial surveys pursuant to the GBRA case and, secondarily, to provide input to Fish and Wildlife Service as I just described on the specific matter of the peak abundance estimates from those surveys.

Q And while you were at the refuge did you also meet with Paul Strobel -- Brad Strobel?

A Brad. Sorry, yeah, that's my confusion. Yes, I did.

Q And who was Brad Strobel?

A He is a refuge biologist who had recently been hired by the Fish and Wildlife Service.

Q What did you discuss with Mr. Brad Strobel?
A I discussed with him the various ideas that I had that -- regarding how the aerial surveys could be improved for efficiency and reliability pursuant to the peak abundance estimation.
Q Now, have you provided the Fish and Wildlife Service with recommendations on how Mr. Stehn's use of aerial surveys to establish peak flock size estimates can be improved?
A Yes, I have.
Q And what were some of those recommendations?
A Well, they fell into three broad categories. The first had to do with what I would term efficiency of the surveys. The second had to do with measures of reliability. And the third had to do with uses of other supporting data.

If I may elaborate on each of those, with respect to the efficiency issues I discovered that for the purpose for the -- the surveys were being flown of -- quite early in the season and quite late into as in October -- starting in October and into March or even April when very few birds were present, which struck me as a dilution of their effort and expenses that might better be focused on a shorter period of time when the birds were present in peak numbers at the refuge. And so I made recommendations along those lines.

The second one was --

THE COURT: Stop. Hold on just a second. I'm

writing this down.

THE WITNESS: Okay.

(Pause)

THE COURT: Okay. Go ahead.

THE WITNESS: All right. The second group of recommendations had to do with -- as I mentioned, measures of reliability as in statistical reliability in which I felt that there were opportunities for incorporation of information about things like detection rates, more appropriate statistical design, with relatively minor adjustments in the way the data were collected and analyzed could result in measures of statistical reliability.

The third area that I thought they could gain some improvements on had to do with the use of data that were being collected for other purposes, principally data on banded marked -- call them banded cranes and also radio transmitters attached to cranes that could be used to provide support or basically test some of the assumptions that are apparently were being made in connection with the surveys about things like ability to detect birds and the movement of birds.

BY MR. FERNANDES:

Q Let's talk briefly about how Mr. Stehn estimates his peak flock size for a given year.

MR. FERNANDES: Defendant's Exhibit 385, please.

Q Now, have you reviewed Mr. Stehn's aerial surveys for the

winter of 2008-2009?
A Yes, I have.
Q And does Exhibit 385 reflect the number of cranes that Mr. Stehn reported observing on each of those flights?
A Yes. The numbers in the red circles indicate the numbers that were actually observed on each flight.
Q And did Mr. Stehn for each of those aerial surveys also indicate the number of birds that he estimated were present on any given flight?
A Yes, that's correct.
Q And during the winter of 2008-2009, what did Mr. Stehn report with respect to the peak flock size?
A It was 270.
Q Now, on any single flight during that winter did Mr. Stehn ever report observing 270 cranes?
A No.
Q Now, from these repeated incomplete counts what, again, was the peak flight -- peak flight -- peak, let me try that again -- peak flock size for the winter of 2008-2009?
A Yes. Mr. Stehn's estimate of the peak flock size was 270.
Q Okay. And let's focus on this whole concept of peak flock size, and then we'll talk about use of aerial surveys to establish mortality. First let's go to Defendant's 77, please.
And have you seen this document before?
A Yes, I have.

Q Let's look at Page 6, Tab 8760. Now, what we're looking at here, is it not -- well, let me ask you this.

Do these numbers reflect peak flock size between 1940 and 2008?

A In 2008, yes.

Q Okay. 247 that's not a peak flock size is it?

A No.

Q So if I'm following this, to determine peak flock size does Mr. Stehn fly -- for example, in '08-'09, a series of eleven flights?

A Yes.

Q Does he count birds when he flies on each of those flights?

A Yes, he does.

Q Does he estimate the amount of birds present on each of those sites?

A Yes, he does.

Q And does all of that then roll up to his number which constitutes the peak flock size?

A That's right.

Q Now, let's go to Defendant's -- well, do you know what the peak flock size was for 2009?

A I believe it was 264.

Q Let's look at Defendant's Exhibit 7, please.

Have you reviewed Defendant's Exhibit 7, which is the

report from August 10th, 2010?
A Yes, I have.
Q Let's look at Page 24, please.
What was Mr. Stehn's reported peak flock size for the winter of 2009-2010?
A 264 total birds.
Q Okay. Now, let's look at Defendant's Exhibit 126.
Have you reviewed this July 2011 report?
A Yes, I have.
Q Let's go to Page 20 on this.
What was Mr. Stehn's reported peak flock size for the winter of 2010-2011?
A 283 total birds.
Q Okay. So now let's go back to Defendant's Exhibit 66 and 77 a minute.
So if I'm following this, what the numbers should be is it goes from 270 to 264 to 283?
A Yes. Those would be the next two dots you would put on that graph, correct.
Q Now, in general, do you believe whooping cranes are conspicuous and highly detectable in the wintering grounds?
A Yes.
Q And do the family groups and pairs have largely predictable locations due to their territoriality?
A They're largely predictable, yes.

Q And do you believe that Mr. Stehn's peak flock size estimates are an important conservation tool for the whooping cranes?
A Yes, I do.
Q And in your opinion, are Mr. Stehn's peak flock size estimates accurate?
A I believe that they are reasonable accurate.
Q And what is the basis of that belief?
A The basis of that belief is my review of his methods and his statements that most cranes are -- the conspicuous nature of the cranes, the fact that they're probably counting most of the cranes on each of these surveys and that when you roll all those numbers up together into a single number we are probably getting something close to the actual peak population size.
Q And, nevertheless, did you provide some recommendations that you thought could help the Fish and Wildlife Service improve upon those peak flock size estimates?
A Yes. You know, as I mentioned, again I thought that the -- at least for the purposes of the peak estimation there was no point in conducting --
THE COURT: The early and the late ones.
THE WITNESS: I'm sorry?
THE COURT: The early flights and the late flights.
THE WITNESS: The early flights and late flights could be eliminated in concentrated -- in the --

THE COURT: I don't think we need to estimate. I don't think that he meant those to be -- have anything to do with peak populations. It was sort of an early warning system to let the population know, all of us know what cranes were here and how they were arriving, and the same thing with leaving.

THE WITNESS: Right.

THE COURT: When we know the last ones have left. And it wasn't really for peak -- and you're correct. I mean it had nothing to do with peak population and cost a lot of money.

THE WITNESS: Yeah. And I suggested that perhaps other methods could be equally effective for those. You know, obviously, it's Fish and Wildlife Service's decision about how to allocate their effort.

The other area that concerned me was that the measures of statements of reliability that have been published with the peak abundance estimates are subjective and I would favor more objective statistically based measures of reliability such as confidence intervals and variances.

THE COURT: Such as what?

THE WITNESS: Confidence intervals on estimates.

BY MR. FERNANDES:

Q Let's talk about whether Mr. Stehn's methodology of presuming cranes are dead if not observed during aerial surveys is reliable. Let's go back to Defendant's Exhibit 385.

Now, is Mr. Stehn's methodology for determining mortality the same as his methodology for determining peak flock size?

A No, it isn't.

Q How does Mr. Stehn determine mortality on the wintering grounds?

A Right. Well, basically he is -- in every one of these surveys he is -- he's got a list of cranes on -- crane territories that he is consulting, and he is tracking those territories from one survey to the next and is basing -- ultimately basing conclusions about mortality on the absence of cranes from territories; so that these would be, obviously, paired adults or juveniles during two or more surveys and so that what we're having -- what we're looking at now is the interval between these incomplete counts rather than rolling all these into a single number; now we're parsing this out into more detailed tracking of individual birds.

Q How is that different -- how is that different from Mr. Stehn's methodology of determined peak flock size?

A Okay. Well, again, you know basically we have -- with the peak flock size we have these totals that are then, in turn, essentially being rolled into a cumulative estimate of the peak flock abundance. In contrast, the mortality estimates are based on attempts to track individual birds on their territories and their fates.

Q Let's use an example. Let's assume that there was a lot of movement and three crane families moved to the uplands and they were observed with sub adults in a group of 15.

If I'm doing -- if I'm counting cranes for the purposes of a peak flock estimate, do I just look down there and count all 15 and get the 15?

A Yes, you do. I mean and that outcome wouldn't matter for that particular survey. They would be counted. Unless you missed that group those birds would be counted.

Q Now, from trying to determine mortality would I have to look down at that group of 15 and try to make some sort of conclusions with respect to which crane family I'm looking at?

A Well, you would. Because as I understand this method, the surveyor would have visited the area where that he was expecting the cranes to be occurring and they would be missing.

Q Now, in your opinion, is Mr. Stehn's methodology for determining mortality reliable?

A No. In my opinion it is not.

Q Why not?

A Because it is -- because there are too many potential ways to confuse the lack of detection of a bird on a territory with things other than mortality. As an example, if a bird -- well, let's say a chick is missing from a territory on a particular survey, there's really four possibilities:

It could be there but not detected. We do know that

the detection rates are not perfect on these surveys. The second --

THE COURT: There are not any chicks in Aransas.

THE WITNESS: I'm sorry?

THE COURT: There are not any chicks in Aransas.

THE WITNESS: Sorry. Juveniles is the correct term. Thank you, your Honor. Or colts as they're sometimes referred to.

And the second possibility is that the bird could be temporarily absent from the territory because of some local movements and then missed.

The third possibility is it could be entirely outside of the area that was surveyed on that flight and missed.

And the fourth possibility is that it could be dead.

BY MR. FERNANDES:

Q Now, in your opinion is Mr. Stehn's methodology of presuming unobserved cranes are dead has that ever been tested, to your knowledge?

A To my knowledge it has not been tested.

Q How would you go about testing that methodology?

A I would try to compare or calibrate that method to a method that is known to be reliable such as radio telemetry or mark recapture, generally speaking a method based on following marked individuals.

Q In your opinion is Mr. Stehn's methodology of presuming

unobserved cranes are dead ever been subjected to peer review publication?
A No, it has not.
Q In your opinion does Mr. Stehn's methodology for presuming unobserved cranes are dead have any known error rate?
A No. Not to my knowledge it has no known error rate.
Q In your opinion does Mr. Stehn's methodology for presuming unobserved cranes are dead have standards controlling the techniques operation?
A The only standards that I'm aware of are the standards for the -- operational standards for how to flight the aerial surveys; so altitude, air speed, that sort of thing. But there don't seem to be any objective standards for making judgments about how to classify a missing bird as dead.
Q In your opinion is the classification of missing birds dead in the manner in which Mr. Stehn is doing it repeatable?
A No, it is not.
Q In your opinion has Mr. Stehn's methodology for presuming unobserved cranes are dead been generally accepted in the field of study in which you have been practicing?
A No. It is not generally accepted to use repeated observations of unmarked wild animals to infer mortality.
Q What is the standard approach?
THE COURT: The Fish and Wildlife Service didn't hire you or ask you to evaluate his mortality counting, Mr. Stehn's

mortality counting?

THE WITNESS: Fish and Wildlife Service -- correct, your Honor. The Fish and Wildlife Service did not.

THE COURT: But GB --

MR. FERNANDES: GBRA.

THE COURT: GBRA did.

THE WITNESS: That's correct.

THE COURT: Okay.

BY MR. FERNANDES:

Q What are the standard approaches for estimating mortality?

A One would be any method of -- first of all that would allow us to track longitudinally known individuals. The classic examples start with the clinical studies -- of course not applicable here, but any time we're able to basically put a label on the animal and follow it through time and determine its fate, radio telemetry would be a field method that would be legitimate for getting inferences on mortality. Marked recapture where we -- or marked re-sighting where we put visible markers with individual tags on the animals that can be then re-sighted through time.

Q Would you need to put radio telemetry devices on the entire flock or a percentage of the flock?

A No. A sufficient sample of the flock would be adequate to provide inferences on mortality.

THE COURT: How many?

THE WITNESS: I would -- off the top of my head I would say on the order of 30 to 40 would be a good sample size.

THE COURT: What do they have now?

MR. FERNANDES: They should have I think 22 going into this year.

THE COURT: Okay. Radio telemetry?

MR. FERNANDES: Yeah, they start at -- and that's -- they started banding after the '08-'09 year. And I think their goal was to band 60 over a three-year period of time.

THE WITNESS: Yeah.

BY MR. FERNANDES:

Q Let's move on and close by looking at Plaintiff's Exhibit 388, specifically Table 1.

Did you create Plaintiff's Exhibit 388?

A Yes, I did.

Q What is Plaintiff's Exhibit 388?

A Okay. This is a table that relates detection on an individual single survey, so if we have several repeated surveys, with overall detection in the course of up to four surveys. And what we're looking at here is, you know for instance if we have a .3 or 30 percent detection rate on an individual survey, we conduct four surveys; the probability of overall detection would be about 75.9 percent so that we would have about a one in four chance of missing an animal on all four surveys. This is assuming that we're doing the surveys at

a time when the population is static, so say at a peak population size and that we're simply looking at the probability of missing the animal anywhere in the surveyed area.

Q What do you mean when you said that this assumes that "the population is static"?

A Well, if the population was undergoing increases or declines, say through migration influx or through mortality or migration outflux, that would change the entire picture here.

Q Okay. Now, if Mr. Stehn observed 75 percent or more of the cranes on each of four different surveys, what does Table 1 tell us about the detection probability over the course of all four surveys?

A We'll have to go to the next page I think for that. I think that cut off on this table. Right.

Yes, that very top figure would tell us that there would be an over 99 percent chance of detecting a bird somewhere in the surveyed area over the entire course of the four surveys, correct.

Q Now, does the overall probability of detection rate in Table 1 apply to Mr. Stehn's methodology of presuming a crane is dead if not observed on two or more successive aerial surveys?

A No.

Q Why not?

A The reason it doesn't is because we're basically drilling down into the observations two levels of detail more refined than this. First of all we're looking at individual survey to individual survey within a season. And second of all we're looking at individual territories.

So it's not simply a matter of a bird being detected anywhere on the survey area over the course of the entire study. It's a matter of correct classification of the bird as being in that territory or having a, you know, mortality fate based on the observations of very different kind of inference.

MR. FERNANDES: Your Honor, I pass the witness.

THE COURT: Thank you, sir.

(Pause)

CROSS EXAMINATION

BY MR. MUNDY:

Q Hello, Dr. Conroy.

A Hello.

Q Good to see you again.

A Likewise.

Q We first met about two months ago when I deposed you in October, October 19th?

A That's right.

Q All right. Just a moment to organize my papers, sir.

Let's start off with the obvious of what you are here to do and what you're not here to do.

When GBRA retained you, you were not asked to actually make any effort to determine whether or not there were excess mortalities in any given year were you?
A That's correct.
Q That is something though that is within your normal scope of expertise and you could do it if so requested couldn't you?
A I could analyze data so as to estimate mortality rates.
Q But they specifically did not ask for that conclusion from you did they?
A No.
Q Likewise, you're not here to render any opinion about the number of mortalities in the winter of '08-'09 are you?
A No.
Q And you're not here to render any opinion about the actual population number of whooping cranes on the wintering grounds of '08-'09 are you?
A No.
Q You understand your sole purpose for being here is to give testimony on the reliability of the methodologies of Dr. Chavez and Mr. Stehn relating to the work they had done on whooping cranes, correct?
A Could you clarify which work you're referring to?
Q Their census estimates of the whooping cranes on the wintering ground. You're here to opine on their methodologies and whether they're reliable or not. That's the bottom line of

why you're here today.
A Specifically, on the methodology to infer mortality rates from the sequential surveys within each year.
Q And the way they do that is presence, absence, if the birds are there. And then we'll get into a little bit once they disappear after detected, they conclude mortality or presume mortality.
You're here to opine on that issue, the reliability of their methods, correct?
A Correct.
Q Now, let's talk -- since you're here I want to talk a little bit about your background so the judge can evaluate what weight to give your testimony and whether you have experience with whooping cranes and methodologies. Because it's kind of you versus Stehn and Chavez, right?
You did not grow up around whooping cranes, right?
A No.
Q You didn't grow up in any habitat that has to do with whooping cranes. You grew up in Michigan, right?
A That's correct.
Q Went to school and did your graduate studies in Virginia, correct?
A In Michigan and Virginia, yes.
Q Your master's thesis had nothing to do with whooping cranes did it?

A No.
Q Your Ph.D. dissertation had nothing to do with whooping cranes did it?
A Nothing.
Q Your Ph.D. was in forest biometrics, correct?
A That is correct.
Q Your dissertation was the understory vegetation and growth in modeling and loblolly pine plantations, right?
A That's correct.

THE COURT: Okay. Let's just all say he knows nothing about whooping cranes. He's a statistical expert.

MR. MUNDY: But, your Honor, I think -- if you'll indulge me, I think you'll see as we build to the point where he forms the basis for his opinions are based specifically on a knowledge of whooping cranes, and that's why he lays -- I'm laying the predicate now and then we'll build to his report and the basis for his opinion.

THE COURT: I think I've got this all figured out, but keep going.

MR. MUNDY: All right.

THE COURT: But quickly.

MR. MUNDY: Yes, your Honor. And I'll tell you, because out of respect for the Court I understand what you're saying, but we're also concerned about any potential appellate issues since this is the only *Daubert* challenge they've

asserted against Stehn and Chavez. So I'm trying to accommodate, of course, your interest but also I have concern.

THE COURT: I bet the Fifth Circuit can figure it out. I bet even the Supreme Court can figure this out.

MR. MUNDY: I would hope so.

THE COURT: But go ahead with your record.

MR. MUNDY: Yes.

BY MR. MUNDY:

Q Now, the experience at Patuxent you did not engage in any research whatsoever with respect to the cranes, whooping cranes, correct?

A That's correct.

Q And now with respect to your position with the University you're on a non-tenured track there and then separately are self-employed with private consulting activities; and that's the capacity in which you're here today, correct?

A That's correct.

Q You're here as a paid retained expert witness through your private consulting; you're not here on behalf of the Fish and Wildlife or the University, correct?

A That's right.

Q You charge $350 an hour, correct?

A That's right.

Q You charged as of the time of your deposition $35,000 for your services to GBRA, correct?

A That sounds like it's correct.
Q And how much more since then, the last two months, over 50,000 now?
A I don't know. It could be approaching that.
Q Okay. Your engagement came directly from the general counsel, your engagement letters came directly from the general counsel of GBRA, and your litigation consulting bills go directly to the general counsel of GBRA, correct?
A That's right.
Q You do not hold yourself out as being an ornithologist, correct?
A That's right.
Q And that at no point in your career have you ever held yourself out as an ornithologist have you?
A No, I haven't.
Q Have never been a member of any professional organizations dealing with ornithology, correct?
A The Wildlife Society deals with ornithology.
Q You're not a member of the AOU, American Ornithologist --
A I am not a -- no, I am not a member of the AOU.
Q Or any of the field ornithologist societies?
A No.
Q You do not consider yourself and do not hold yourself out as a field biologist, correct?
A No, that's not correct. I have substantial experience in

field biology throughout my career, especially when I was at Patuxent.

MR. MUNDY: May I approach the witness, your Honor?

THE COURT: Do you just want to put it on the overhead?

MR. MUNDY: Oh.

BY MR. MUNDY:

Q Sir, you were asked there are people --

THE COURT: That's not an exhibit, right?

MR. MUNDY: It's not. That's why I was --

THE COURT: Put it right down. It shows up on your screen.

MR. MUNDY: Oh, I'm --

THE COURT: And his screen.

MR. MUNDY: Oh, got you, your Honor.

THE COURT: And nobody else's.

MR. MUNDY: Got it.

THE COURT: I have every gadget imaginable.

MR. MUNDY: I do believe that. I'm not quite up to the full power here.

THE COURT: See, but it just makes it easier.

MR. MUNDY: Absolutely.

BY MR. MUNDY:

Q You were asked, weren't you sir, this very subject:

"There are people who are field biologists, they go

around, count birds, plants, trees, a few things like that; they are out there walking in the mud, whatever. You would not hold" -- starting at line 8 -- "you would not hold yourself out as being that kind of field biologist; is that accurate? Your answer was: "Yes," correct?

A It was I was asked if that was historically what I had done mostly, and that answer was, yes, it is not what I historically -- or, no, it is not historically what I have done mostly.

Q Well, the exact quote was, "You would not hold yourself out as being that kind of field biologist; is that accurate?" And your answer was "yes," correct?

A Yes.

Q Now, likewise, other than being involved in this case you have never once done any sort of field study related to whooping cranes, correct?

A That's correct.

Q You have never -- other than your involvement in this case, you have never done any analysis of field studies of whooping cranes, correct?

A Correct.

Q You have never at any point in time held yourself out as being an expert on whooping cranes in any capacity or even the crane family of birds, correct?

A Correct.
Q Now, there were three primary bases for your testimony and opinions you formed in this case. The first was when you were retained, which occurred in August 2010, right?
A Correct.
Q The law firm for GBRA assembled a substantial amount of material, literature and sent it to you, correct?
A That's correct.
Q And the second -- and that included all kinds of whooping crane literature, studies, food, foraging, published reports we've heard a lot about, *Hunt and Slack* example, right?
A That's correct. In addition, I did my own searches on the area of everything I could find of whooping cranes --
Q All right.
A -- and of live birds, to be thorough.
Q Okay. And secondly, they sent you Mr. Stehn's reports and emails of which we've seen much of in this case. They gave you those, correct?
A Correct.
Q And they gave you their summaries with highlights of what they thought was important from those. They gave you a chart broken down with the highlighted points of what was important to them, correct?
A That's right.
Q Now, you had prior to that time never been on Mr. Stehn's

email distribution list for his reports through the years; you'd never regularly received those or ever received them had you?

A No.

Q And then finally, you went in December of 2010 and spoke directly with Mr. Stehn at the refuge, correct?

A That's right.

Q Now, let's talk about the December 2010 meeting with Mr. Stehn. You personally requested that meeting, correct?

A That's right.

Q You made the request in late November or early December 2010, and that request was accommodated very promptly wasn't it?

A Yes, it was.

Q The day of the meeting you did not tell Mr. Stehn that you were in there in your capacity as a litigation consultant for GBRA did you?

A I had told Mr. Stehn and Mr. Alonso in advance of the meeting of that fact.

Q You did not tell Mr. Strobel that you were there in your capacity as a litigation consultant for GBRA did you?

A I saw no need to. He is supervised by Mr. Alonso.

Q Now, you did, in fact, bill for all of your time and travel as a litigation consultant to that meeting; billed for traveling down, attending it, expenses, so forth? That was a

litigation driven consulting activity, correct?
A That's correct.
Q Now, you would agree that the meeting started with a cordial atmosphere and Mr. Stehn gave you about a two-hour, roughly, presentation on whooping cranes, in general, and then explained what he did, right?
A Yes.
Q Then after that you started asking some questions about the mortalities in the winter of '08-'09, and at that time Mr. Alonso became upset and informed you that you hadn't informed him for your purpose of being there, correct?
A He didn't put it quite that way. He said that he -- he claimed that he was not aware I was there for that reason.
Q Okay.

THE COURT: Well, did you tell him you were?

THE WITNESS: I had told him in advance, yes.

THE COURT: Okay. What did you tell him exactly?

THE WITNESS: I told him what I had told the Court earlier, that I was there for the purposes of background on this case and also to provide advice to the Fish and Wildlife Service on the conduction of these surveys.

THE COURT: Okay.

BY MR. MUNDY:

Q Well, sir, in fact, you were not there in any capacity whatsoever with respect to services for Fish and Wildlife

Service were you?
A I was not paid by the Fish and Wildlife Service.
Q Well, sir --
MR. MUNDY: May we have the Elmo? Page 60.
Q At Page 60, line 17, you were asked specifically: "Were you there in any capacity whatsoever with respect to services for Fish and Wildlife Service?"
And what was your answer at Line 19, sir?
A It was no. And my interpretation of "services" was paid services, sir.
THE COURT: Oh, come on. That's just not nice.
BY MR. MUNDY:
Q Now, at any point in the meeting did you tell anybody that you were there in any capacity with respect to doing work for Fish and Wildlife Service?
A I'm sorry. Please restate that.
Q Let's see if I can refresh your memory, sir.
THE COURT: So today you say that you were there on behalf of the Fish and Wildlife?
THE WITNESS: No. As I said, I was there principally on behalf of GBRA, the client.
THE COURT: Well, not principally. Were you there at all on behalf of the U.S. Fish and Wildlife Department?
THE WITNESS: Yes.
THE COURT: Okay. And what did you tell -- who did

you speak to in the Fish and Wildlife Department after you met with Mr. Stehn and Mr. Alonso?

THE WITNESS: Mr. Strobel and I also spoke to Mr. Harris.

THE COURT: In the Fish and Wildlife Department? Who did you speak with in the --

THE WITNESS: Fish and Wildlife Service, yes. And I have provided them with reports, which the Court has, on my recommendations.

THE COURT: I still don't understand why you said in the deposition that you weren't there on behalf of the Fish and Wildlife Department.

THE WITNESS: I think I was interpreting that question too narrowly.

BY MR. MUNDY:

Q Well, sir, maybe if I can refresh your memory further. If we turn to Page 60, line 20, you were asked:

"At any point during that meeting did you tell anybody that you were there in any capacity with respect to any work you were doing for the Fish and Wildlife Service?

And what was your answer at line 24? Please --

A Not to my knowledge.

Q Correct.

THE COURT: So that's different today?

THE WITNESS: I don't believe that I told anybody at that meeting that I -- specifically that I was there for that purpose.

THE COURT: I thought you said --

THE WITNESS: -- at the meeting.

THE COURT: -- that you had told Mr. Alonso in advance. Is it "Lazono" or --

THE WITNESS: Alonso.

THE COURT: Mr. Alonso in advance that you were coming on behalf of the Fish and Wildlife.

THE WITNESS: What I had said earlier that I was coming to gain facts for this -- for GBRA case and to provide them with advice on their surveys. And I told Mr. Alonso and Mr. Harris --

THE COURT: Fish and Wildlife?

THE WITNESS: Correct.

THE COURT: Okay.

MR. MUNDY: Plaintiffs offer Plaintiff's Exhibit 389, a April 22, 2011 email from Mr. Conroy to Mr. Grant Harris at Fish and Wildlife Service; and also Plaintiff's Exhibit 390, an August 19, 2011 email from Mr. Conroy to Mr. Harris, and I've just shown to opposing counsel.

MR. FERNANDES: No objection.

MR. MUNDY: May we have the Elmo, please?

THE COURT: I'm sorry, the numbers?

MR. MUNDY: 389 is a April 22, 2011 email with attachments.

THE COURT: Okay. Just give me the numbers. You're offering them for evidence.

MR. MUNDY: 389 and 390.

THE COURT: Thank you. And there are no objection?

MR. FERNANDES: No objection, your Honor.

THE COURT: They are admitted.

(Plaintiff's Exhibits Numbers 389 and 390 were received in evidence)

MR. MUNDY: May we have the Elmo, please?

BY MR. MUNDY:

Q 389, which was Exhibit 3A of your deposition, is a Friday, April 22, 2011, two thousand eleven email from you, Michael Conroy, signed in your capacity with your consulting company, M.J. Conroy Wildlife Biometrics, to Mr. Grant Harris at the Fish and Wildlife Service, correct?

A That's correct.

Q And it states:

"Grant, I haven't forgotten about cranes. Here, as promised, is a brief report that summarizes some issues on the crane surveys and makes some recommendations. As noted, I'm basically parsing out a bit that deals with, more specifically, the peak abundance issue, which is what I think you're mainly

interested in. Let me know if you have any questions. Best, Mike."

Correct?

A Correct.

Q And you transmit what you've referred to a couple of times now as some report, a summary or short report that you've referred to, is attached as an attachment to that email, correct?

A Yes.

Q So the meeting is December 10. The report was sent five months later, right?

A Yes.

Q In fact, the report as we see on page -- excuse me -- Plaintiff's Exhibit 390, your email of August 19, 2011, this is from you again to Mr. Grant Harris at Fish and Wildlife Service. And this is the Albuquerque regional office, correct?

A That's right.

Q Not the refuge, right?

A Correct.

Q Now, here these are recommendations from your GBRA review. All of this work, the prior one and this one, are basically extracts from your GBRA expert report, correct, and the work you did for GBRA, right?

A This is -- yes.

Q And here, in fact, we see conventions that are a little

more familiar to lawyers and people working Word documents with the line numbering down.

That's not the way you would normally turn things in into a scientific paper, true?

A No. Many journals ask for lined -- lines on submitted articles.

Q In any event, you very clearly disclose that this is part of your GBRA litigation consulting activity here, right? It says it right up there --

A Yeah.

Q -- it's from your GBRA review.

A Okay.

Q Doesn't it?

A Yes.

Q Okay. The work is being done for GBRA with excerpts given as a courtesy, if you will, to Fish and Wildlife.

A With the full knowledge of GBRA.

Q Okay. Now, that brings us to the next point.

You conferred with Mr. Fernandes and disclosed to Mr. Fernandes what was going on, and after some discussions you all decided it would not be a good idea for you to pursue further work with Fish and Wildlife Service, correct?

A No.

Q Didn't you believe that it would create or put you in an uncomfortable position and create the appearance of a conflict

of interest or something that could reasonably appear to an outsider to be a conflict of interest?

A I thought that at the time, yes.

Q Okay. And you continued to do the work for GBRA, right?

A Yes.

Q You've done no further work for Fish and Wildlife as of this time on this issue have you?

A That's right.

THE COURT: I'm also assuming from what he was asked to do by U.S. Fish and Wildlife that he was asked to look at the peak season counts, and apparently he found those Stehn's satisfactory. He had some offers to make about how it could be improved, but he thought he got the right numbers and that the fish -- I assume from that that Fish and Wildlife had no doubts as to the mortality count of Mr. Stehn. This is one of the intervenors that has the doubts.

MR. MUNDY: I think that last statement is absolutely accurate, your Honor.

BY MR. MUNDY:

Q Now, while you were down for the meeting after -- while you're down for the meeting December 2010, you went on one of the commercial tour boats, the sightseeing boats to go see the cranes, right?

A Right.

Q And you went -- there are two of them. There's one run by

Captain Tommy Moore and another one, the Wharf Cat is a different boat, right?

A Right.

Q And you understood at the time that both of the tour boat operators were members of the Aransas Project, the group bringing this case in which you were retained.

A Actually, I didn't know that.

THE COURT: I'm sorry I didn't hear that last question.

MR. MUNDY: Pardon?

THE COURT: What was the last question? I missed it.

MR. MUNDY: I was asking him my -- whether or not he knew that the tour boat operators were members of the Plaintiff in the case.

THE COURT: Okay.

BY MR. MUNDY:

Q In any event, you talked with Tommy Moore, had a good time on the trip?

A Correct.

Q Saw a crane?

A I saw several cranes.

Q Saw several cranes. You'd never seen them prior to that; am I correct?

A I'd never seen them in the wild.

Q In the wild. Fair enough.

A Yeah.
Q All right. Let's change gears totally here. Let's talk about context importance of Mr. Stehn's work and Dr. Chavez's work, all right?
When you talk about a species population of 300 individuals, there is not much room for mistake in managing that from a conservation standpoint is there?
A I'm sorry. Could you repeat that question?
Q Certainly. When you're talking about a group of less than 300 individuals, there is not a room for mistakes.
A I would agree.
THE COURT: Have you ever done a statistical analysis on such a small population?
THE WITNESS: Yes. Some of the beach mouse populations that we worked on a few --
THE COURT: Some of the what?
THE WITNESS: Beach mouse, Alabama beach mouse. Some of those populations are quite small.
THE COURT: How small?
THE WITNESS: Florida panthers is another one that I've been involved in.
THE COURT: How small is the --
THE WITNESS: Beach mouse, two to three hundred. Florida panthers fewer than a hundred.
THE COURT: Okay.

MR. MUNDY: May I proceed?

THE COURT: Yes. I guess I was thinking that you would have to change your model a little bit for the really limited population of the Florida panther, the beach mouse, the whooping crane.

THE WITNESS: It would depend on what you were trying to do. I think that the statistical methods for estimating population parameters would be similar regardless of the population size.

THE COURT: Okay.

BY MR. MUNDY:

Q You would agree that a population of 300 of a species is an incredibly low number and one that is still very vulnerable and very at risk of extinction?

A I certainly agree.

Q It's true that population surveys are an important conservation tool for whooping cranes.

A I agree.

Q And you agree that because of the life history of cranes -- and by that I mean their behavior through the course of the year, where they are, breeding, where they come for wintering, that it is really only practical to do the population surveys on their wintering grounds?

A I agree with that.

Q Now, with respect to the recovery team, do you understand

what that group is, the U.S. Canadian Whooping Crane Recovery Team, five members from the U.S., five from Canada?

A Yes, I do.

Q And they meet regularly and they have formal recovery plans they revise periodically, right?

A That's correct.

Q And you yourself have never participated in the preparation of the recovery plan have you?

A No, I haven't.

Q You have never been requested by that group to work as part of their recovery team have you?

A Actually, I was requested shortly after I arrived at the Georgia Cooperative Research Unit to serve as a scientific advisor on the recovery team and I declined.

Q Actually, at the time of your deposition your answer to that question was, no, you had not. But then you later sent in an addendum correction sheet changing your answer to that, correct?

A That's correct, because I remembered that event that had happened over 20 years earlier.

Q Okay. Now, you would agree that your input has never been requested by anybody on the recovery team, correct?

A Correct.

Q You've never made a presentation to the recovery team at their periodic meetings have you?

A No, I haven't.
Q You've never been requested to come in and do an evaluation by the recovery team of Mr. Stehn's methods or Dr. Chavez's methods have you?
A No.
Q You would agree that the recovery team for decades has relied on Mr. Stehn's aerial surveys and the data obtained from that.
A They have.
Q The recovery team year in and year out and still currently relies on his data.
A Yes, they rely on the peak abundance estimates, correct.
Q And I believe you misspoke with Mr. Fernandes, but Mr. Stehn, in fact, did publish a paper describing his methodologies in 2008, the *Mr. Stehn and Taylor Paper,* correct?
A That paper specifically dealt with the aerial surveys for peak abundance, and to my recollection it did not deal with mortality estimation.
Q Her Honor has the paper and so she can evaluate.

Now, you would agree that whatever the shortcomings of Mr. Stehn's methodologies, the recovery team's decisions they have been making in relying on Stehn's data and his methods, whatever they're doing, good, bad or indifferent, it has worked thus far; there were cranes have recovered remarkably.

A The cranes do seem to be recovering, yes.
Q The management team -- the recovery team is doing something right aren't they?
A It means that the cranes are recovering, yes.
Q Now, as far as you know other than your role as a litigation consultant in this case, no one has ever published or at any workshop or at any recovery meeting or in any writing stated that Tom Stehn's data is unreliable have they?
A I am unaware of any evaluation of his data collection methods or analyses in the peer reviewed literature other than those published by him.
Q Well, the recovery team evaluates his information year after year as we've just discovered. They are his peers and he has to stand up and look them in the eye doesn't he?
A Yes.
Q Now, let me repeat my question, sir, and perhaps I can just refresh your memory so we can move along -- the not displayed publicly to the Court but the -- just the -- there we go. Thank you.

I direct your attention to Page 75, line 15, sir. I'll give you a moment to read that to help refresh your memory so we can move on.

It's true that so far as you know, other than you in your role as a litigation consultant in this case, has anybody ever published or at any workshop or at any recovery meeting or

in any writings stated that Tom Stehn's data is unreliable? And your answer is "I am not aware of any such statement."

Is that accurate?

A That's accurate.

Q Now, at least as of October you did not know the names of people who published reports with population numbers before Mr. Stehn did you?

A I did not know several of them, correct.

Q Now, you did not, for example, know who Robert Porter Allen was did you?

A I didn't. I do now.

Q Yes. You had told the Court and Mr. Fernandes that you did an exhaustive search of literature when you were retained as an expert but you didn't find Robert Porter Allen's work did you?

A I was specifically looking at aerial survey and other statistical methods associated with cranes, and that name did not come up.

Q And you didn't know who George Stevenson was did you?

A No.

Q In forming your testimony and your work here with respect to the evaluation of estimation of mortality, it's true that in your opinion the strong and persisting territoriality and parental care of whooping cranes makes it possible in theory to closely account for individual fates, even unmarked birds, and

thus to infer absolute and per capita mortality.

That's a literal statement of yours isn't it?

A Yes, it is in theory possible.

Q Okay. Now, your personal opinion is that based on certain specifics you've learned about whooping cranes from your involvement in this case; you don't believe quite as strongly in that because you believe, first, territoriality, site fidelity, parental care, peer bonding, while all strong are not obsolete -- or excuse me -- not absolute, correct?

A Correct.

Q And as we've already discussed, before your involvement in this case you'd never considered yourself an expert on whooping cranes did you?

A No.

Q You learned all of that from the materials provided to you by the GBRA lawyers and what you found in your work as a litigation consultant in this case, correct?

A Yes.

Q And you cite for your propositions there the work of Bishop 1984. Who do you know who Bishop is?

A Yes.

Q Do you know that person's first name?

A Mary.

Q Yes. And that comes from a private published dissertation, correct? That was given to you -- it came from

her dissertation that was given to you by the lawyers, right?
A It's also available through Texas A & M University.
Q But it came to you from the lawyers; they gave it to you.
A Correct.
Q And you relied on Chavez-Ramirez 1996.
A Yes.
Q You know who he is don't you?
A Yes, I do.
Q You consider him to be an expert on whooping cranes don't you?
A I do.
Q And while you disagree with Mr. Stehn's inferences and analyses you do recognize him as an expert on whooping cranes.
A Yes.
Q A man who's devoted decades of his career to saving them, true?
A Yeah.
Q Now, you also cite as a basis for your opinion you just gave for questioning your first proposition *Hunt and Slack 1987*. That's another article the lawyers gave you isn't it?
A Yes.
Q You would agree that people have been attempting to do absolute counts of whooping cranes for decades; in fact, since the 1930's, true?
A Yes.

Q And they've been reporting those numbers for decades and decades even before Mr. Stehn, true?
A Yes.
Q And that the people who are charged with their recovery have relied on those numbers for decades, both Stehn's data and his predecessors, true?
A They've relied on those annual peak count estimates, yes.
Q You agree -- well, let's get our terminology down here. I want to be careful about terminology. A census -- and then let's talk about terms. Census or enumeration, that is e-n-u-m-e-r-a-t-i-o-n, an enumeration, is a different thing than a survey or statistical estimate of a population, correct?
A I agree.
Q You would agree that what Stehn and his predecessors have attempted to do is not a statistical measure or a statistical estimate of the number of whooping cranes; they try to conduct an absolute count of the number of individuals present, right?
A They characterize it as a census.
Q And that's what that -- is meant by that term. A "census" is an absolute true count. It is in no way a statistical estimate, correct?
A Yes.
Q And some literature if the judge happens to see in literature of the wording "enumeration," that is a synonym for census, as generally used, correct?

A Yes.
Q It means also that absolute true count as compared to a survey or a statistical estimate of population, correct?
A Correct.
Q You agree that a census may be possible when the animals, or birds in this case, are known to have strong sight tenacity. It is possible in that instance, correct?
A It is possible.
Q You agree that the putative census involves identifying and mapping boundaries of defended territories; that's kind of the core starting point for that, correct?
A That's one method that's used, correct.
Q And you agree that Mr. Stehn -- and, in fact, I think we saw one of his maps this morning. You were in the courtroom this morning?
A Yes.
Q Did you see the counsel for -- I think it was Mr. McCarthy -- for SARA had put up one of the actual maps that Stehn has with the territories mapped out on it, right?
A Yes, I've seen those.
Q And you understand that when he flies the routes, he has the maps actually -- the territory maps in his lap and he's marking and looking as he goes along, right?
A Yes.
Q You would agree that this method is not based on a

standard statistical sampling frame, and you are not aware of any way to provide measures of statistical reliability for that method; is that correct, sir?

A That's correct.

Q Yet you would agree that that method is thought by many people -- I'm not saying you necessarily, but many others -- that that method can provide reliable estimates, right?

A Many people believe that.

Q Yes. I'm not trying to convince you that you do, but you agree that others in the field do.

A Yes.

Q Okay. You would agree -- well, we'll just skip that. Let's talk about the factors, particular factors in Mr. Stehn's methodology for a little while, all right?

First is detectability. You agreed that whooping cranes on the wintering grounds are highly detectable.

A I agree.

Q They are very conspicuous in the types of habitats they favor on the wintering grounds, correct?

A Correct.

Q You agree that Mr. Stehn is incredibly unlikely to confuse a whooping crane with a great egret.

A I agree.

Q You agree it is highly, highly, unlikely for him to confuse a crane or whooping crane with a white pelican.

A I agree.
Q And the same is true for a snow goose, highly unlikely Mr. Stehn would confuse those two.
A Agree.
Q Now, you would agree that the general community surrounding the Aransas refuge area they are very aware and sensitive to the presence of the cranes, the Rockport, Fulton, Austwell communities are very conscious and cognizant of the presence of these cranes.
A Yes.
Q And you agree that this area in the winter is a hot spot for birding tourism.
A Yes, of course.
Q And many people such as you come to see the cranes, right?
A Yeah, right.
Q You would agree a that birder with even moderate level skills should be able to readily identify a whooping crane if it wandered away from a normal peer territory, right?
A I'm sorry. Would you please repeat that?
Q Certainly. If a whooping crane wanders over, say, to Fulton Beach just by an odd chance, given the number of people here in the winter who are birders and the conspicuousness of the whooping crane, it's likely that bird is going to be detected.
A If it was right there on Fulton Beach, sure.

Q Okay. Let's talk about the area of coverage of census flights, all right?
A Okay.
Q You agree that as general proposition the family groups and pairs have largely predictable locations due to their territoriality on the winter grounds.
A I would agree.
Q You would agree --

THE COURT: I think it's also been testified to by crane experts that the presence of the parents is necessary, absolutely necessary to the survival of a juvenile.

MR. UNIDENTIFIED: Right.

BY MR. MUNDY:

Q And you agree with that, sir?

THE COURT: Yes, that has been said, Ms. Robb --

MR. FERNANDES: By their experts.

THE COURT: Yeah. But I haven't heard experts say anything else.

MR. FERNANDES: Yes, you've heard -- what we did is we went through Mr. Stehn's own article where he says that juveniles can and do survive outside of their parents. Dr. Archibald said --

THE COURT: I think he said it was very rare, though.

MR. FERNANDES: Yeah. And Dr. Chavez-Ramirez as well.

THE COURT: They both said it was very rare but --

MR. UNIDENTIFIED: Yeah.

THE COURT: I understood that the accepted theory that the presence of one or more parents is necessary to the survival of a juvenile, ordinarily.

MR. FERNANDES: We think --

THE COURT: There have been very few cases where juveniles have survived without the presence of a parent.

MR. FERNANDES: We think that's because they don't have the bands and they don't -- they're not tracking them anymore. The observations are --

THE COURT: I think they're just truants.

MR. FERNANDES: If you look at all the --

THE COURT: Delinquents.

MR. FERNANDES: If you look at the 1993 paper, in the 1993 paper he specifically says this is what we learned from bands. And so our position is, is because they're not banded, that's why they're just assuming they're dead when they don't see them as opposed to in the old days when they were banded find out they were alive and they do, in fact, live without their parents.

THE COURT: Okay. I understand your position but I'm not sure anybody has testified to that, that it's usual to survive without the parents. I thought it was unusual to survive without the parents.

MR. FERNANDES: I think we had testimony in that regard from Dr. Slack.

THE COURT: Oh, well, okay. I don't remember that. I'll review it, though. I'm going to have to listen to everything again when I go through the exhibits. I know.

MR. MUNDY: May I proceed?

THE COURT: Yes.

MR. MUNDY: With respect to the --

THE COURT: Well, I was proceeding.

MR. MUNDY: That's why I -- I give you the ultimate --

THE COURT: No, go ahead.

MR. MUNDY: The ultimate --

BY MR. MUNDY:

Q Sir, continuing on in the area of coverage of the census flights, you would agree that every area known to have the cranes was covered in recent years; every area known to have cranes in recent years was covered during the course of the season, although it might be missed on a particular given day. Is that accurate?

A I would agree.

Q You would agree that Stehn and his predecessors have tried to use methods which would help them determine presence or absence of cranes in a particular area through the course of season such as the use of repetitive attempts to locate a

particular bird.
A I agree.
Q Let's talk about the timing of the census flights.
From your readings with respect to this case, you agree that the birds migrate down in small groups; it's not in mass migration like we see with, say, broad-winged hawks, correct?
A Correct.
Q But by mid December the birds largely have all arrived and then none start to return until the end of February or early March. So that period of mid December through mid February, roughly, is a -- they've all come down but they haven't started going back home.
A Right. I think I would perhaps narrow that from mid December to late January, but you know generally speaking I agree with that.
Q Well, two months ago you agreed that there was a two-month window from mid December until mid February, true?
A Yes.
Q Okay. You agree that that is the optimal time window to conduct what we are terming "peak abundance," right?
A Agree.
Q Let's talk about air speed and altitude and his method.
You agree and you believe that he is flying at appropriate air speeds and altitudes to optimize detection of

the birds, correct?
A Yes.
Q Let's talk about the number of surveys, multiple repetitive attempts.
You agree that conducting multiple surveys is something he is doing right.
A I agree that that's a good thing to do.
Q And doing it repetitively over time increases the accuracy versus if you just went out and did it one time.
A It increases the probability that you won't miss the bird over the course of those four surveys, of course, or --
Q And, in fact, we're going to talk about your chart where you lay out the number of surveys, how many seen versus probability of detection and non-detection.
But that's what that chart gets at, correct?
A Correct.
Q Bottom line though, you agree more independent separate occasions attempting to conduct the same route increases accuracy of observations as a general proposition, correct?
A Correct.
Q Now, let's talk about Stehn doing it time after time after time versus rotating observers every time.
It's better that you're not rotating and having different observers on each outing, correct?
A Introducing multiple observers between surveys introduces

variability. There is a role for multiple observers on the single flight to do a cross check on one another.

Q Putting more people on the plane on the same flight is better than just one. Is that what you're saying?

A It's better for two reasons. One, it enhances the probability that somebody will detect a bird. Also, that sort of setup results in a -- what's known as independent observer type of data collection where you can actually estimate the probability of detection on the fly.

Q Has anybody ever flown with Mr. Stehn, say, 30 times, 40 times in a row, same somebody else, to your knowledge?

A To my knowledge, no.

Q Okay. All right, we'll leave it at that.

You agree that another thing he is doing right is attempting to cover the entire range in a single flying day?

A Yes.

Q With respect to his integrity as a scientist, you do not contend that he makes up data do you?

A No.

Q And you have -- while you may disagree with the conclusions he draws from his observations, you agree that from everything you know he is an honest a person and attempts to the best of his ability to give honest, accurate reporting of what he is observing.

A Certainly.

Q Now, we've seen much of his emails and his field notes where he makes various observations about limitations of what he's seen on a given day.

So I want to discuss his particular self-critique and disclosures as it relates to general field biologists and their field reports for a moment, all right?

A Okay.

Q You would agree that field biologists to be objective should report what they find, but they should also report if they feel like they have a problem and objectively disclose any limitations on their findings, correct?

A Correct.

Q You agree that that is a legitimate part of the scientific process, to engage in self-critique, self-disclosure of limitations of their observations, and the data and conclusions to be drawn from it, right?

A I agree.

Q You would agree that the failure to make sure disclosure would be a flaw in and of itself.

A Yeah, I agree.

Q And that to be an objective scientist you want to put that in your notes so your colleagues can take that into consideration when they are analyzing your data, right?

A Correct.

Q And the bottom line, it's appropriate and, in fact, good

that Stehn reports whatever differences or potential issues he encounters on a particular flight, right?
A I agree.
Q You have personally seen field observers who don't report problems they encounter when running a transect through the years, right?
A I am not aware of any but I'm sure it occurs.
Q Okay. That failure would be a serious problem, right?
A It could be, yes.
Q The fact that his self-reporting concerns are unusual findings, that is not an unusual thing to see in field notes of a biologist --
A No.
Q -- a field observer is it?
A No, not at all.
Q Now, despite your criticisms of Mr. Stehn's methods, you agree, bottom line, that it is likely that most, if not all, cranes present in the survey area are detected on any given survey, true?
A True.
Q You agree --
MR. MUNDY: And, your Honor, with all due respect, this is his term so I'm just quoting his exact term.
Q But you agree that because of strong and persisting into winter territoriality and parental care it is theoretically

possible to find and count every parent and every chick, "chick" being your term, right?

A Correct.

Q You agree that "Thus, aerial surveys of whooping cranes at Aransas would seem on first examination to come very close to meeting the standard for a complete consensus," right?

A Right.

Q And by "complete census" that means that absolute total count.

A Correct.

Q The real problem you have is the conclusion that Stehn draws from his presence/absence when he detects or doesn't detect a bird on two or more surveys, and from that he presumes mortality.

A Correct.

Q Okay. Let's talk -- you've done --

MR. MUNDY: If we may have the Elmo, please.

Q Mr. Fernandes started on this but I'd like to talk in some more detail. This is Plaintiff's Exhibit 388. This is a table you prepared as a part of your report that shows the statistical correlation between number of attempts or flights or transects, how many times you go out separate occasions. That would be this, (indicating), column. This would be like one survey day, two survey day, three survey days, four survey days.

Separate, totally separate days is what you mean by this, (indicating), column, correct?

A Separate and independent surveys of the entire area, correct.

Q And then this column, detection, 0.3 means you detect 30 percent of the population on that one particular day; that's what that detection column means, correct?

A Correct.

Q So it just carries forward over here, detection .3 -- since we only have a sample of one, it means .3, you detected 30 percent; so it's obvious the non-detection of 70 percent.

A Correct.

Q Right? Now, next column, you know .5 means you detect 50 percent of the flock on a particular day. The .75 means you detect 75 percent of the flock on a particular day. And then on to the back page, .9 would be you detect 90 percent of the flock on a particular day, correct?

A Correct.

Q And in our discussions you and I just kind of cut to the bottom line here.

You agree -- we've heard Mr. Stehn testify that in his opinion he detects 95, 97, 98 on a particular day. And for you you're not willing to concede that. You're not saying it's right or it's wrong, for you would consider that a gray zone in your mind whether he's detecting that high a percent on a given

date, right?
A Correct.
Q But you and I did come to the conclusion that in your opinion he was detecting 90 percent during the optimal period.
A Not on a given day. I thought what we had agreed on was 75 percent.
Q Okay. Well, let's just --
A I mean it --
Q Let's just go to 75 percent right now --
A Sure.
Q -- so we can keep this moving. You would agree that if he detected 75 percent on four flights during the optimal period, that would translate to detection of 99.6 percent with a detection rate of .4 percent -- or .4 non-detection?
A Right. That means that over the course of those four surveys over the entire area there was a .4 percent chance of missing a bird over the entire area.
Q Well, in your deposition we translated that to a detection of plus or minus one bird. It's a real bird, right?
A Okay. Yes.
Q Okay. And that's only detecting 75 at a rate -- detection rate of 75 percent of the flock, right?
A Correct.
Q Okay.
THE COURT: Have you got lots more?

MR. MUNDY: Yes, your Honor. Should we break?

THE COURT: It's a good time for a break. 1:30? Thank you.

THE MARSHAL: All rise.

(A recess was taken from 11:58 a.m. to 1:57 p.m.; parties present)

THE COURT: Do you want to take the stand again please, sir?

(Pause / Court confers off the record)

MR. BLACKBURN: Mr. Mundy will be here in just one second.

THE COURT: I knew he would.

MR. BLACKBURN: He has been sited upstairs.

THE COURT: Pardon?

MR. BLACKBURN: He has been seen upstairs.

THE COURT: Good, good. A little longer lunch for you all than I had intended. The criminal stuff went longer than I thought.

(Pause)

Is he going to show up do you think?

MR. BLACKBURN: Well.

THE COURT: Thanks. Thanks, Mr. Castillo.

MR. UNIDENTIFIED: There he is.

THE COURT: It's all over.

(Laughter)

MR. MUNDY: I do understand that we're down to two or three witnesses, so we might be done pretty quick today.

THE COURT: That would be nice.

(Pause)

MR. MUNDY: All right. If I can have just a moment, your Honor, to collect all...

(Pause / Voices heard off the record)

THE COURT: Oh.

MR. MUNDY: Sorry. I'm trying to keep all that away from her.

CROSS EXAMINATION (CONTINUED)

BY MR. MUNDY:

Q All right. We finished with that table so let's move on to the next topic, all right?

You agree that -- what I want to do now is look at things from a field biologist's perspective as they relate to kind of what you do statistical type things.

You agree that biologists must be involved at the nexus of how the data are collected, how they are analyzed, how they are ultimately applied to biological understanding and conservation decision making. You agree, right?

A I agree.

Q You would agree that abundance is a central driver of many ecological processes and estimating abundance is a common problem in ecological studies.

A Agreed.
Q Thus, you agree that obtaining accurate estimates of abundance remains an important task for ecologists, in general, with crucial consequences for endangered species.
A Agreed.
Q And agree that problems associating -- excuse me -- problems associated with estimating the abundance of a rare species over comparatively larger areas are well documented; that's true.
A True.
Q And that the essential problem involves patchily -- that is a patchy distribution -- with some patches occupied at high density and others at lower densities and still others not at all, correct?
A That's one problem that can occur, yes.
Q Okay. And you would agree that it's inefficient to exert equal amounts of sampling effort in all the patches because of that, true?
A Yes, I believe I said that.
Q That would mean that you have to basically kind of get to the core of it, you have to go into it with some rough understanding of where you're likely to find these rare birds or rare whatever else you may be looking for.
A True.
Q You agree that as a general proposition there are many

different ways of doing bird surveys, censuses, enumerations and many different protocols out there. Each has its own particular strength and suitability, and each will have particular weaknesses inherent to the nature of how it's conducted, correct?

A Agreed.

Q You agree that yours is not the only way to do it.

A To do what?

Q Censuses, enumerations, surveys.

A There is more than one way to estimate abundance, yes.

Q Okay. Let's talk about a type of a model that you referred to as a WHR, a wildlife habitat relationship model. That's a term that you've used in some of your -- or at least in one of your papers, correct?

A Correct.

THE COURT: It's called a what?

MR. MUNDY: WHR, which is Wildlife Habitat Relationship Model.

BY MR. MUNDY:

Q And in your view there are generally two types of WHR models. Number one is a model based on assemblage of expert opinion about wildlife habitat relationships such as habitat, suitability index models. And number two would be an empirical model that relates the occurrence of a given species in a location to some victor of measurements taken on that location

through a variety of statistical means, correct?
A I would agree there's two types of models that are not mutually exclusive.
Q Yes. And the methodology that you tend to use would be the second type of model, the empirical model with the statistics.
A I've done both.
Q Okay. The number one model is based -- the one based on the assemblage of expert opinion about wildlife habitat relationships, that would be an example such as the whooping crane recovery team and the plans they draw; that would be an example of the first type of model, correct?
A I'm not sure that there's a model involved there, but it could be.
Q Well.

MR. MUNDY: May I have the Elmo, please, without the judge's screen on?

Q If I asked you that question in your deposition, would you agree that that was asked to you and that's how you answered it?

I can refresh your memory if you need it, sir. Page 178, line 10. Excuse me, line 13. You were asked:

"The number one model, the model based on assemblage of expert opinion about wildlife habitat relationships, that would be a model such as used by

the whooping crane recovery team and the plans they draw. Would that be more in the first model type?" And your answer was:

"I believe it would be." Is that --

A I agree --

Q Okay.

A -- to the extent that that's an assemblage of expert opinion, yes.

Q Well, I thought we'd already agreed that is, in fact, what that team is. You don't contest that do you?

A No, no, not at all.

Q Okay. So trying to understanding the philosophical camps, there's the whooping crane recovery team, which will be Stehn and his colleagues. And then your second philosophical camp an empirical model that relates occurrence of given species in a location to some victor of measurements taken on that location through a variety of statistical means, correct?

A Not entirely. I believe that the two complement one another.

Q Well, in fact, that exact question was asked in your deposition at Page 178, line 22. Line 22:

"So I am trying to understand the philosophical camps. There's the whooping crane recovery team, which would be Stehn and his colleagues, and then you're in the second one, the empirical models

that" --

Continue on to Page 179:

-- "relate to occurrence of given species in a location to some victor of measurements taken on that location through a variety of statistical means."

And your answer was simply one word, "Yes."

A Okay, yes.

Q Let's talk for a moment -- your counsel has presented earlier in the case some discussion about the significance or non-significance of finding four carcasses in the winter of 2008-2009, so I want to talk about that for a little bit, okay?

This is something you've discussed and published on yourself, true?

A I have a publication on carcass retention in the field, yes.

Q Yeah. I think you used the term "persistence," which means how long the carcass lasts out in the outdoors.

A Right, correct.

Q You agree that carcass counts can provide valuable information regarding wildlife mortality investigations, correct?

A I agree.

Q And such counts can be influenced by the accuracy and precision of the search method, meaning search for the carcass, right?

A Yes.
Q And also includes by the time interval between the mortality and the search, true?
A Yes.
Q And also the rate in which a carcass decomposes or is removed by scavengers, correct?
A Yes.
Q Scavenger assemblages in the area is a factor, correct?
A Yes, it would be.
Q As is the weather and habitat characteristics which may influence duration of the carcass persistence and cause variability in the rate at which carcasses disappear, correct?
A Yes.
Q Furthermore, in several studies the majority of carcasses completely disappeared, true?
A True.
Q You agree that a myriad of scavenging species represent potential sources of avian carcass disappearance, correct?
A Yes.
Q And those scavengers are likely to differ across environmental settings, correct?
A Yes, correct.
Q At the Aransas Refuge -- and I won't regale the Court with all of them -- but there's a long list of potential scavengers in the refuge, true?

A Yes.
Q And you would also agree that feral hogs are abundant out there.
A Yes, I would.
Q And feral hogs it's fair to say are a major problem on that refuge? Well, you agree that feral hogs are highly aggressive in scavenging; they're all nevorous; they'll eat anything -- just about anything in their path, true?
A Yes.
Q Now, in your study on carcass persistence or rate of disappearance, you all had a crow hunter save crow carcasses for you and you all collected house sparrow carcasses until you had a big batch of them, and they you all put them out in a variety of settings and measured how long they persisted in the wild, right?
A Yes, correct.
Q And --

MR. FERNANDES: Your Honor, with all due respect I'm trying to figure out this fits within the scope of the direct. I think that the carcasses at issue may be birds and how it relates to -- he offered no opinions in his expert report on how long it's going to take --

THE COURT: Yes, he said that he did disagree with the methodology for Mr. Stehn's mortality data collection. And I was thinking the same thing. I was going to ask him, well,

if you have four carcasses sitting there how was that -- how can you extrapolate that and could you to reasonably say 24 or 23 were missing that year? And I think that this -- I would assume that this is what he does, leave out carcasses and see how long it takes.

MR. MUNDY: And actually I have statistics --

MR. FERNANDES: It has nothing to do with this -- it was a study that had nothing to do with aerial surveys and the like, but that's okay. That's why I mentioned my objection.

THE COURT: I don't see this -- I just see it is it reasonable if there are four carcasses found in the winter season that 23 could have died?

THE WITNESS: That's possible. We would have to have some idea of the persistence in the detection rate.

MR. MUNDY: And Judge, I'm about to go over -- he actually has statistics from studies about the rate of disappearance in various scenarios, and I think they are -- the Court might find them helpful, as would any reviewing Court, to evaluate the significance --

THE COURT: Are you trying this to me or to the Fifth Circuit?

MR. MUNDY: To both. See all of the above. I'm more -- since *Daubert* is the only issue and he's here, so half for you and half for the Fifth Circuit --

THE COURT: Well, you know I certainly appreciate

that. I'll just step out while you finish.

MR. MUNDY: No --

THE COURT: No, no. Go ahead.

(Laughter)

BY MR. MUNDY:

Q In your study, 82 percent of carcasses disappeared or decayed within six days, right?

A I don't recall which species you're referring to. Is it the crows or the sparrows, or both?

Q Well, at Page 184, line 17. Let's see if we can refresh your memory here. Can you see that on your screen? You answered the question yourself at the deposition and said: "Most of the crows, sparrow carcasses, yes."

A Yes. I wasn't referring to specifically the 82 percent figure. That was my question.

Q Well.

A The data would have combined those two species, which are very vastly different.

Q The example -- let me just repeat the question.

THE COURT: In their eatability or what do you mean?

THE WITNESS: In how long they persist in the wild. Crows will persist quite a big longer than sparrows will due to their size.

//

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BY MR. MUNDY:

Q Well, Dr. Conroy --

THE COURT: You know, I know I'm fascinated with this because if you go to Africa and you see a lion kill, say a Thomson's gazelle, in about seven hours everything is gone because there's this massive disposal system with a very large animal even. You have the hyenas coming in for the bones, the wild dogs do this, I mean everybody's got -- and the vultures have their part. I mean it's just like this huge massive disposal system. You can watch the layers go by. So I was surprised to hear that anything lasted in the wild here much longer than that.

BY MR. MUNDY:

Q And on average Mr. Stehn was flying his flight surveys once a week or sometimes once every two weeks back in '08-'09 during the winter period, correct?

A I believe that's correct, yes.

Q All right.

THE COURT: So have you heard of that happening?

THE WITNESS: I'm sorry, your Honor?

THE COURT: What I've described about what happens what I observed in Africa?

THE WITNESS: Yes. Then that's -- well, in a humid environment with a lot of scavengers that would probably happen quite rapidly. I --

THE COURT: A human environment?

THE WITNESS: Humid.

THE COURT: Humid.

THE WITNESS: Tropical.

THE COURT: I didn't know that -- and we're talking central east Africa.

THE WITNESS: Okay. I'm --

THE COURT: I mean that's somewhere around the Serengeti. I mean it's not humid.

THE WITNESS: Okay. I'm not an expert on that system, your Honor.

THE COURT: So why would the crows -- I mean it's the same here thing, right? I mean why would the crows last so long?

THE WITNESS: They last longer than sparrows, but neither one of them last particularly long. They do last longer than sparrows.

THE COURT: Well, six days I think is a long time.

THE WITNESS: Well, the statistic was 82 percent had disappeared within six days. Many of them disappeared sooner than that.

THE COURT: Like within a day?

THE WITNESS: Probably so, yes. I don't have the figures in front of me. There's a -- I'm certain there's a graphic in that article that would give the details on the

day-by-day persistence.

MR. MUNDY: Judge, I have more from his paper, I have more --

THE COURT: Well, I'm just curious. And I know, you know, this is my own personal knowledge but I wanted to mention that, because I would just find it in a wild environment that it would take so long for those carcasses to disappear. Now, in front of my house that's another thing altogether.

MR. MUNDY: It stays forever, right?

THE COURT: Yes.

MR. MUNDY: Especially if it's a skunk?

THE COURT: But I'm just saying, you know, that's a different environment altogether. We don't have that many predators in the neighborhood.

MR. MUNDY: I have several statistics from his study where he cites other studies. I'm going to go through those for a moment. I think they will be illuminating on this point.

THE WITNESS: May I clarify something? I believe in that study -- now, this is a study that was done by a student whose committee I was on, and I'm a co-author on that study -- that that study involved placement of carcasses in both rural and urban environments.

THE COURT: Oh, okay.

MR. MUNDY: Yes.

THE COURT: Well, can we just stick with the rural

environments, how quickly these things disappear. I would think it's a matter of hours and not days in a rural or wildlife refuge.

MR. MUNDY: And, in fact --

THE COURT: Nothing inhibits the scavenger and the carrion. So you're going to get me there?

MR. MUNDY: Yes, your Honor.

THE COURT: Okay. I'll wait.

BY MR. MUNDY:

Q And just to kind of answer her question immediately, the ones in kind of -- you all confirmed what was intuitive to most people. The ones in the city lasted longer than the ones in the country. In the country there were more predators, more scavengers, more things eating it.

A Yes.

Q The ones in the country disappeared faster than the ones in the city, bottom line.

A Uh-huh.

THE COURT: I guess I'm just surprised that anybody would do a study like that. It seems --

MR. MUNDY: I was a bit myself but --

THE COURT: -- self-evident.

MR. MUNDY: -- it's amazing there is --

THE COURT: Scattering carcasses around.

THE WITNESS: Well.

MR. MUNDY: And he wasn't the first one. There's a few others he cites, and I'll go briefly --

THE WITNESS: The reason for that study was because people were using discovery of carcasses to make conclusions about this Sparta (phonetic) West Nile Virus. And this was specifically to point out that both the persistence and the detection of carcasses depends on where the birds die. And that could influence your conclusions about the Sparta West Nile Virus. So the main point of this paper, in fact, had to do with use of carcasses to provide evidence for outbreaks of West Nile virus in the Atlanta area.

THE COURT: Well, I apologize for impugning your carcass throwing.

(Laughter)

BY MR. MUNDY:

Q And you referenced other prior studies that had been done up to that time. I would like to go over just a few of those and hit kind of the conclusion, if you will, for the Court in all of our illumination, all right?

You included a discussion of Balcomb in 1986, which reported that 92 percent of song bird carcasses were removed by scavengers within five days, correct?

A Uh-huh. Correct.

Q And when I see you nod your head and go "uh-huh," I get it. But for the record we need "yeses" and "nos" if you would.

A Correct. Yes.
Q You also reported a study by Wobozer and Wobozer in 1992, who had reported that of 275 chicken carcasses only two had been in place for over 24 hours were found; is that correct?
A Correct.
Q In your own study you found that 64 percent of all carcasses were removed by day two of their placement, correct?
A Correct.
Q You also noted another study of duck carcasses in Texas wetlands, and that reported that 62 percent of the duck carcasses in Texas wetlands were gone within three days, correct?
A Correct.
Q You also noted another study of an orchard in which 25 carcasses were placed out, and 25 of 25 were gone by the next day, correct?
A Correct
Q I think that's Tobin and Dolbeer (phonetic), correct?
A Correct.
THE COURT: Were these urban or rural studies?
MR. MUNDY: That was an orchard.
THE COURT: Okay.
MR. MUNDY: Like a fruit orchard. So farm environment, so intermediate.
//

BY MR. MUNDY:

Q Farm would be an intermediate step between the urban versus wildlife refuge.

A Well, in some cases I think farmers could concentrate more predators and scavengers than either one of those other environments, but I get your point.

Q Let's change gears. You've done some analysis of scientific data with respect to some other endangered species, the red cockaded woodpecker and the Florida panther, correct?

A I analyzed data for red-cockaded woodpecker. The Florida panther was not a data analysis, per se. It was a review of other people's studies.

Q That's what I mean, yes, sir.

You were doing somewhat similar to what you did here. You didn't do the original work and get data gathering. You went and did an analysis of that data set and how it was being utilized.

A That's correct. That was one of the scientific advisory teams that I referred to earlier.

Q Okay. Both the red cockaded woodpecker and the Florida panther are formerly listed endangered species, correct?

A Correct.

Q And in neither of those studies did you find, in your opinion, that the underlying data and the way it was being used, in your opinion, was reliable and accurate; is that

correct?
A In the Florida panther case that's certainly correct. The red cockaded woodpecker case the conclusions were confined to a single refuge in Georgia.
Q But you did not -- your walk away was you did not opine that the way the data was utilized was reliable and accurate in your opinion; is that correct, sir?
A I believe the conclusion was that it wasn't being effectively used to support decision making.
Q Have you published anything with respect to endangered species where you say you think the existing science is reliable and accurate?
A No.
Q Thank you. Let's talk about what reliability means to you. The term "reliability" to you means the ability to use data to draw inferences about the real world, correct?
A Correct.
Q And you do not yourself consider yourself to be qualified to serve as a member of the recovery team for the crane, the whooping crane, correct?
A No. That's not correct. I mean I would have been -- I was invited and I would have been capable of serving when I --
THE COURT: In what capacity?
THE WITNESS: As a science advisor.
MR. MUNDY: May I have the Elmo again?

BY MR. MUNDY:

Q Let's look at Page 202, line 24.

"QUESTION: Do you feel like you are sufficiently an expert on the whooping crane that you're qualified to serve as a member of the recovery team for the whooping crane?"

And your answer was: "No," correct?

A That is correct. My answer a moment ago referred to advice on science issues.

Q And using your definition of "reliability," meaning the ability to use data to draw inferences about the real world, the members of that recovery team do find Mr. Stehn and Dr. Chavez's work reliable enough to draw inferences about the real world. I'm not saying you agree with it; but they do, correct?

A They rely on his peak estimates of abundance, correct.

Q Well, in fact, in the most current publication of Dr. Slack he, in fact, relies on Mr. Stehn's mortality information doesn't he? Or excuse me, a manuscript accepted for publication by Karine Gil-Weir, William Grant, Douglas Slack and Mr. or Ms. Wang and Fujiwara.

And this is a manuscript you've actually received from the lawyers as part of your review materials entitled *Demography and Population Trends of Whooping Crane,* correct?

A Correct. I've reviewed that manuscript and I would like

to comment on the substance of that analysis. I believe that that analysis referred to, is based on interannual estimates of survival, not within your estimates of survival.

MR. MUNDY: I would offer the paper by Karine Gil-Weir -- that's G-i-l hyphen W-e-i-r Grant, Slack, Wang an Fujiwara as Plaintiff's Exhibit 390.

THE COURT: We have a 390.

MR. MUNDY: What's the next thing, Mr. Waites?

MR. WAITES: It would be 391. I'm sorry I didn't have a 390.

MR. MUNDY: Three nine one.

MR. FERNANDES: No objection.

THE COURT: 391 is admitted, Plaintiff's 391.

(Plaintiff's Exhibit Number 391 was received in evidence)

BY MR. MUNDY:

Q And to your knowledge this is the most current work --

MR. MUNDY: May we have the overhead Elmo?

MR. FERNANDES: Your Honor, if we could provide the witness a copy.

MR. MUNDY: I have only one and I'm going to put it on the Elmo so we can read it together.

THE COURT: Okay. Do you have one?

MR. TAYLOR: We don't have one in the courtroom, your Honor.

THE COURT: Pardon?

MR. TAYLOR: We don't have one with us in the courtroom, your Honor.

THE COURT: Okay.

MR. MUNDY: I will give it to them. I'm only offering --

THE WITNESS: This has been submitted for publication. Okay.

BY MR. MUNDY:

Q And Dr. Slack is one of the co-authors? R. Douglas Slack, you know who he is, right?

A Yes.

Q Okay. And without going through the entirety of the paper, the reason I bring it up is he -- or I guess it's Dr. Gil-Weir discusses methods of her papers, and it is replete at Page 6 with references to Stehn articles, Stehn data throughout the entirety of this -- collected at the ANWR -- excuse me -- the Aransas National Wildlife Refuge replete with reliance on Stehn, correct?

A Their reliance on Stehn counts over the course of the season. There's a equation that's relevant here that's in that paper.

(Pause)

MR. MUNDY: Just a moment, your Honor. I'm sorry, Mr...

(Pause / Voices heard off the record)

BY MR. MUNDY:

Q And at Page 6, at Page 6 of this article which -- or excuse me -- this publication of which Dr. Slack is a co-author, midway down, data -- "Data included censuses of juvenile, sub-adults, adults, observations of banded birds and reports of mortality," specifically uses the "reports of mortality."

I'm reading that literally from the publication am I?

A You are. I don't believe the reports of mortality were used directly in the estimates in this paper. If we could see the equation in which they entered the data, I could respond.

Q Well, let's go ahead and finish the sentence out here.

A Okay.

Q With the latter usually inferred from the disappearance of an individual from the territory.

And who do they cite as the authority for that proposition of which they found reliable enough to put in their paper?

A It says "Stehn 2004." And I'll point out that this paper is in peer review; it has not been accepted in a journal.

Q Dr. Slack found it reliable enough to put his name to it didn't he?

A I haven't discussed the paper with Dr. Slack.

Q You agree that people who consider themselves to be experts on whooping cranes have found that Stehn's observed

data is reliable enough for them to formulate management plans, recovery plans and do so year after year for decades now. That's the bottom line even though you don't, correct?

A I would agree that people have relied and continue to rely on his estimates of peak abundance.

Q And what they've done thus far has been successful.

A Apparently so.

MR. MUNDY: Nothing further, your Honor. I pass the witness.

THE COURT: 391 where is the -- I need the Exhibit 391.

MR. MUNDY: Oh, your Honor, it's in my stack.

THE COURT: Thank you, Ms. Gano.

(Pause / Voices heard off the record)

MR. FERNANDES: Your Honor, we'd move to admit Defendant's Exhibit 426.

MR. MUNDY: No objection, your Honor.

MR. FERNANDES: Let's just cover a couple of --

THE COURT: Hold up.

MR. FERNANDES: I'm sorry.

THE COURT: I'm slow. 426?

MR. FERNANDES: Yes.

THE COURT: It's admitted.

(Defendant's Exhibit Number 426 was received in evidence)

//

REDIRECT EXAMINATION

BY MR. FERNANDES:

Q Let's try to just cover a few subjects in about five minutes or so. One thing I want to cover is that meeting that you had with Mr. Stehn, Mr. Alonso, Mr. Strobel and Mr. Outen on December 13th of 2010.

Now, I believe you testified that after Mr. Stehn made a presentation to you at that meeting, Mr. Alonso became agitated and suggested that he didn't know that you were there on behalf of GBRA. Do you recall that testimony?

A I do.

Q And did they say that they thought you were there just on behalf of the Fish and Wildlife Service?

A That's what they said.

Q All right. Let's look at a series of emails that were sent the Friday before your visit, Defendant's Exhibit 426, please. Let's read these emails. Let's go to the bottom of the email, please.

Do you see there, this is an email from Mr. Stehn to Mr. Alonso, your copied and it goes to Mr. Strobel? Do you see that?

A Yes.

Q And these --

THE COURT: Hold up. I'm reading.

MR. FERNANDES: Sure.

(Pause)

THE COURT: Okay.

BY MR. FERNANDES:

Q Now, was this email December 10th sent the Friday before your Monday morning meeting?

A Yes, it was.

Q Okay. And in this email that you were copied on, didn't Mr. Stehn specifically tell Mr. Alonso that he talked with you to get squared away for next week?

A Yes.

Q And did he also say that Ron Outen of the Aransas Project will attend so that both sides of the lawsuit will have equal access to information?

A That's correct.

Q And was Mr. Outen at that meeting as well?

A He was.

Q Let's look at the email on the top of Defendant's Exhibit 426. Do you see this is an email from Mr. Alonso to you and cc Grant Harris?

A Yes.

Q Is Grand Harris your contact at the Fish and Wildlife Service?

A Yes, in Albuquerque.

Q Is he the person who is supervising you today in some projects that you're doing for the Fish and Wildlife Service in

connection with evaluating aerial surveys?
A Yes.
Q And do you see here on this email Mr. Strobel, who was also attendee at the meeting on December 13th, was copied?
A Yes, I see that.
Q And do you see here it says, "It's not a big deal. Tom is simply honoring our solicitors' advice and providing equal access to information?"

Now, let's go on and look at Defendant's Exhibit 104. Let me show you an email that was previously introduced into evidence in this case dated December 10th, 2010.

And again, was that the Friday before your meeting?
A Yes, it was.
Q And this is an email from Mr. Stehn to Mr. Outen -- inviting Mr. Outen to that meeting?
A Yes, it is.
Q Let's look at what it says. "Your presence will deflect a major part of my anger on this whole thing since at least both sides of the lawsuit are represented."

Do you see that?
A Yes, I do.
Q And then at the last sentence:

"I'm hoping Conroy with half a brain will come to admit I know how to find cranes, though he can certainly write his report on the limitations of the

census accuracy or whatever else GBRA wants him to do."

A Yes, I see that.

Q And they suggested halfway through the meeting they didn't know that you were there representing GBRA?

A Alonso suggested that, yes.

Q Let's go on. Let's go to Defendant's Exhibit 77. Let's go to Page 6 and let's talk about these population counts.

Now, in the cross examination there were a lot of questions about who's relied upon Mr. Stehn and who hasn't relied upon Mr. Stehn, so let's talk about that for a minute.

These are population counts; are they not?

A These are estimates of peak winter abundance, yes.

Q Have you reviewed the recovery plan?

A Yes.

Q Do they rely upon these peak counts?

A They do.

Q Do they rely upon Mr. Stehn's mortality data?

A Not as far as I can tell.

Q Have you reviewed the 19 publications cited by TAP in response to Defendant's motion to exclude the testimony of Mr. Chavez-Ramirez?

A I have.

Q Do any of those publications evaluate Mr. Stehn's methodology of determining mortality?

A In my opinion, no.
Q To the extent that they rely on Mr. Stehn's numbers, do they rely upon population counts?
A They almost entirely rely upon population counts and not on mortality.
Q Now, if we look at Defendant's --
THE COURT: I guess I'm not -- you have to help me here. If the population count turns out to decrease over the season and he says Mr. Stehn -- Mr. Stehn's population counts are correct and he begins with 270 and ends with 249, isn't the difference a mortality rate?
MR. FERNANDES: No. This --
THE COURT: I don't see him attacking the 247 number. It's up there with the rest of them.
MR. FERNANDES: No, he already said the 247 doesn't belong there. That number for the year -- the correct number, is 264. The reason why that's up there --
THE COURT: The 264 for the following year.
MR. FERNANDES: But...
THE COURT: Right. Instead --
MR. FERNANDES: Every single number up there is a number that's the peak number. And so that's apples and oranges. The only non-peak number up there is the last one, because the only one who relies upon it is Mr. Stehn and TAP. They use that to solicit numbers. But if they -- the honest

number for that year is 264. Then it goes to 283 and it goes to 300. That's what everybody else is relying upon.

When you look at all those articles that they dumped on you, the article dumped and 19 articles, you'll see that they're relying upon population counts. In fact, some of those articles they take the population counts and they extrapolate through statistics to come up with their own mortality numbers. So they're not relying upon his mortality numbers. They rely upon peak population counts. The peak population counts don't -- the only way you get to 23 is you kind of cheat at the end and you throw in the end of the year number. Not a single number on that chart is an end of the year number. Every number --

THE COURT: Got it.

MR. FERNANDES: -- is a peak population.

THE COURT: Got it. Thank you.

BY MR. FERNANDES:

Q Now, is it possible that the reason why the Fish and Wildlife Service didn't ask you to evaluate Mr. Stehn's mortality data is because they don't rely upon it either?

A They don't --

MR. MUNDY: I object. I object. This is asking him to speculate. One, I think it's an incorrect assumption. Two, it's asking him to speculate --

MR. FERNANDES: I'll move on.

MR. MUNDY: -- on state of mind and policy of the Fish and Wildlife Service.

MR. FERNANDES: I'll move on.

THE COURT: Okay, go ahead.

BY MR. FERNANDES:

Q Are the methods that you suggested for determining mortality some of the methods that are generally accepted by experts in your field?

A Radio telemetry reencounters would be one. Marked recapture would be another one. Tag recovery is another one.

Q Other than to detect carcasses have you ever seen an aerial survey being used to detect mortality of an unmarked animal?

A No.

MR. FERNANDES: Pass the witness, your Honor.

THE COURT: Thank you.

RECROSS EXAMINATION

BY MR. MUNDY:

Q Two brief points. You agree:

"If territories remain fixed over a given period of time and individuals within territories are relatively easily counted or distinguished by age, sex or other attributes, then sequential visits to the territory may be capable of providing inference on mortality subject to caveats."

A I agreed subject to caveats.
Q Now, I'm also confused about you just told Mr. Fernandes that you are doing consultation work on aerial surveys with Fish and Wildlife.

Is that on the whooping cranes you're saying or something else?
A No, I previously disclosed that I was doing consultations on aerial surveys with Fish and Wildlife Service on desert big-horn sheep.
Q Ah, okay. Thank you, sir. On the whooping cranes you felt like there was a potential conflict of interest or it could be perceived as such and you've declined to continue that work while you're doing your litigation consulting activities for GBRA; is that accurate?
A Yes.
Q Okay. Thank you, sir.

THE COURT: Are we done?

MR. UNIDENTIFIED: Nothing further from me.

THE COURT: Thank you. You may stand down.

(Witness steps down)

Call your next witness.

MS. ROBB: Defendants call David Sunding.

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DAVID SUNDING, DEFENDANTS' WITNESS, SWORN

THE CLERK: Please have a seat.

THE COURT: Yes, please.

DIRECT EXAMINATION

BY MS. ROBB:

Q Please introduce yourself to the Court.

A My name is David Sunding. Last name is spelled S-u-n-d-i-n-g.

Q Let's look at Defendants' Exhibit 244, please.

Dr. Sunding, is Defendants' Exhibit 244 a true and correct copy of your CV?

A Yes, it is.

Q And what is your occupation?

A I'm an economist.

Q What is your educational background?

A I have a Ph.D. in agriculture and resource economics from the University of California at Berkeley, master's degree in a somewhat unrelated field, African studies from UCLA and an undergraduate degree in economics.

Q And where are you employed?

A I'm a professor at UC Berkeley.

Q Do you have an endowed chair there?

A Yes, I do.

Q And what's the name of it?

A The chair was endowed in honor of Thomas Graff, who was

the western regional director of the Environmental Defense Fund. The chair was established in 2009 by, not Mr. Graff himself, but by a very generous donor to Berkeley. And it was set up in the area of natural resources with an emphasis on market mechanisms for protecting environmental quality.

Q Further down on that page I see that you are listed as the founder and co-director of the Berkeley Water Center. What is that?

A The Berkeley Water Center is a research center. It's an interdisciplinary center at UC Berkeley that's set up to sponsor large, again, interdisciplinary projects in the area of water resources.

Q And how long have you been employed at UC Berkeley?

A On and off since 1992.

Q Let's turn to Page 38. What is your previous employment prior to Berkeley?

A So when I say "on and off" I had a break in the middle. I was a senior economist at President Clinton's Council of Economic Advisors where I worked in the area of energy environment and natural resources.

Q And have you received any honors or awards in your professional capacity?

A Yes, I have. I've --

Q And -- sorry.

A I'll go ahead and elaborate. I won an award for the

outstanding journal article from the American Agriculture Economics Association. Also numerous research awards, grants from National Science Foundation, EPA, Department of the Interior, private foundations.

Q Have you authored any peer reviewed publications?

A Yes, I have.

Q Let's look at your publications listed there. Please turn to Page 39. Tell us about *Economic Impacts, the Endangered Species Act F 30.*

A Right. So that was a paper that arose out of a -- I'd say a fairly prominent conference at the University of California at Santa Barbara. One of the organizers was Bruce Babbitt, who was the Secretary of the Interior.

THE COURT: Was who?

THE WITNESS: Bruce Babbitt.

THE COURT: Oh, okay. I thought you said "muppet."

THE WITNESS: Oh, sorry.

THE COURT: My hearing is going, too.

THE WITNESS: Sure. And it was to review the performance of the Endangered Species Act after the first 30 years. And you notice the publication date on there is 2006. It took a few years to get the book out the door.

BY MS. ROBB:

Q The next highlighted article is *The Economics of Environmental Regulation by Licensing, Observations on Recent*

Changes to the Federal Wetland Permitting Program. Tell us about that.

A That was a paper that explored the economics of, again, what we call environmental regulation by licensing, programs where unlike a simple tax or a standard, someone has to go and get a permit to do something that has negative consequences for the environment.

Q And I remember when the decisions came out. That was cited in the Supreme Court's decisions in *Rapanos and Carabell;* isn't that right?

A Yes, it was.

Q At the bottom of the page, *Measuring the Cost of Re-Allocating Water from Agriculture, a Multi-Model Approach*, what was that about?

A That was a paper about issues that are somewhat related to what we're discussing in this proceeding, what are the economic consequences of re-allocating water from developed uses to the environment. And in the course of writing that paper we conducted both conceptual investigation and then fleshed it out with some empirical work.

Q Let's go to Page 43, technical reports.

What is the *Economic Impacts of Flow Requirements for Delta Dependent Species* about?

A Well, this report, again, relates to issues that I think are quite similar to what are at issue here. The flow

requirements that I'm talking about in this study relate to instream flows into the --

THE COURT: Relate to what?

THE WITNESS: Into the -- instream flows into the San Francisco Bay Delta Estuary. There's a number of endangered species in that estuary, wetland complex. And what we are doing in this report was investigating the economic consequences of instream flow requirements.

BY MS. ROBB:

Q Let's go to Page 45. You also co-authored *Water Quality Regulation in the San Francisco Bay and Delta for EPA.* What is that about?

A Right. Well, just proving that nothing in water is really over. This was from almost exactly 20 years ago. The research was done about exactly 20 years ago. It relates, again, to the San Francisco Bay Delta Estuary. And the water quality regulations there, again, have to do with salinity and inflows. Very, very similar to what we're talking about here.

Q In addition to this academic research have you done work on resource matters?

A Yes, I have.

Q And could you give us a flavor of that work?

A Sure. I'll give you just a sampling of some, you know, more practical of non-academic activities. I was heavily involved in the quantification settlement agreement on the

Colorado River. I was actually a member of the negotiating team for one of the parties. And the quantification settlement agreement basically divided up the allocation of the Colorado River among the lower state -- or the lower basin parties: California, Arizona and Nevada. So that would be one example.

I'm involved currently in the so-called tri-state dispute on the Apalachicola Chattahoochee Flint -- sorry, it's a mouth full -- involving the water supply to Atlanta, among other issues. And I'm also involved in a case for which the Supreme Court has original jurisdiction, the Republican River dispute among Colorado, Kansas and Nebraska.

Q And have you worked on any habitat conservation plans, HCP's?

A Yes, I have.

Q Could you give us a flavor for that work?

A Sure. Well, I mentioned the San Francisco Bay Delta Estuary twice now at least. That situation is ending up potentially being resolved through a habitat conservation plan. And I'm working on behalf of the state of California to evaluate the economics of the habitat conservation plan.

I've also been involved in the Clark County habitat conservation plan. Clark County is the location of Las Vegas and it covers about 200,000 areas for the desert tortoise.

I've also been involved in a habitat conservation plan in California, another -- or large one in Yolo County.

Q And in --

THE COURT: When you say you're involved, what is your involvement?

THE WITNESS: It's normally to calculate the economic consequences and to calculate the financing stream that's required to carry out the conservation measures that are listed in the HCP --

THE COURT: So it would give the legislature a handle on how much money to appropriate, if any, or how much money you need to raise, is that what --

THE WITNESS: Yes. Although the money is usually raised from the permitees. It could be housing developers or water agencies. So they have to self-finance it, typically.

THE COURT: Do you have your own company to do that or how --

THE WITNESS: Yes. Oh, sure. That's not done through the university. I have a relationship with a consulting firm, and work on that is done by people at the consulting firm under my direction.

THE COURT: Okay. So usually what happens the permitees go to your consulting firm and say we want you to work with us?

THE WITNESS: Yes.

THE COURT: So you work for the developers or whatever?

THE WITNESS: Yes.

THE COURT: Okay. Well, I mean that makes sense. They're the ones with the money, right?

THE WITNESS: Yes, exactly. And again, they need to figure out -- housing development is a little bit different than water resources. But they would have to figure out, say, for every housing unit to be constructed in the area covered by the plan should the fee be $100 or $1,500, $3,000; what would have to be a fee that would generate a sufficient revenue stream to cover the conservation activities that are listed in the HCP.

There's another question, too. The HCP everyone that I am aware of is a voluntary activity. At the end of the day it's about getting a take permit, and there are different pathways to get the take permit one --

THE COURT: It was voluntary because if you want the take permit, usually you have to do an HCP.

THE WITNESS: Well, you can get a take permit short of doing an HCP. The HCP, the basic economic bargain, is essentially paying for extra conservation measures above and beyond what would happen without the HCP. And in exchange for that the permitees get some regulatory assurances. And so the fundamental question that we're often asked to address is are the regulatory assurances worth the extra cost.

THE COURT: What regulatory assurances? Can you give

me some examples?

THE WITNESS: Essentially, if conditions change, if the species continues to decline or if there are other species that are discovered in the area that become endangered, then the permitees would get regulatory protection, so-called safe harbor protections.

THE COURT: So that means they can continue to develop without regard to the species going down.

THE WITNESS: Yes.

THE COURT: Or new snail darters being discovered or whatever.

THE WITNESS: Roughly, yes. And there are all kinds of legal complications that I'm sure the attorneys could tell you about, but that's the basics of it.

THE COURT: Okay.

THE WITNESS: And the costs, by the way, your Honor, are not small. The Bay Delta habitat conservation plan that I'm right in the middle of working on right now is probably by any measure the largest HCP ever attempted in the country.

THE COURT: Is that San Francisco Bay?

THE WITNESS: Yes, it is. And the --

THE COURT: And the reason for that, what kind of taking?

THE WITNESS: Well, it's take of a whole complex of fish species. The little tiny one, the delta smelt, is sort of

the bellwether species. But there are salmon as well, and they are taken into the pumps.

THE COURT: So what do your people want to do?

THE WITNESS: Well, I'm working for the state so --

THE COURT: Okay. That's what --

THE WITNESS: -- we're doing an --

THE COURT: So that's a different thing altogether.

THE WITNESS: -- independent evaluation of it. But just to give you a sense of the costs, that's a $25 billion investment that would be made as part of the HCP. And again, the basic --

THE COURT: To do what? What do they do?

THE WITNESS: The HCP would involve construction of about 100,000 acres of aquatic habitat, combination of tidal marsh and other kinds of upland habitat within the delta itself. But the major expense is a new way to convey water around the delta. I don't know if you've heard of the famous Peripheral Canal debate in California, but this is what the Peripheral Canal is.

THE COURT: Yes.

THE WITNESS: It's to avoid withdrawing water out of the wetland itself and essentially move it around. And that's considered to be much more protective of the environment than the current water export system.

THE COURT: Can something like that be done here?

THE WITNESS: I'm not sure. I haven't investigated that so I probably shouldn't offer an opinion on it.

BY MS. ROBB:

Q Dr. Sunding, you mentioned that you work for the state of California, you've worked with EPA, you've worked with developers.

What other entities have you worked with?

A Well, I've worked with a number of environmental groups. I've testified in Congress on behalf of the Natural Resources Defense Council, Environmental Defense Fund. I've testified in court on behalf of a group of native Hawaiians who are represented by what used to be the Sierra Club Legal Defense Fund. Now it's called Earthjustice. That was the *Waiahole Ditch* case, which has become from what I understand fairly well known in water law circles.

Q And do you teach at the University of California at Berkeley in addition to your other activities and academics?

A Yes, I do.

Q What courses do you teach?

A My current rotation is a graduate course in environmental and research policy and undergraduate course in natural resource economics and then another undergraduate course in water resource economics.

THE COURT: So how many courses do you teach a semester?

THE WITNESS: Well, it depends. Either one or two.

THE COURT: Okay.

THE WITNESS: The normal load at Berkeley, believe it or not, is two classes a year. So I'm teaching a little bit more than -- I know the taxpayers are getting their money's worth. But my load this year is three classes.

THE COURT: And besides that you have to do -- would be on committees.

THE WITNESS: Oh, sure.

THE COURT: I mean for graduate students.

THE WITNESS: Yes. At a, you know, top-tier research university like Berkeley the graduate student advising is considered to be a kind of teaching, and that's a lot of what we do. The grant writing support of the graduate students, the mentoring, their research, then jointly with the graduate students and with your faculty colleagues, that's all the, you know, probably primary part of the job. And then the teaching is part of it, too, the classroom teaching.

THE COURT: Okay. Thank you.

THE WITNESS: Yes.

MS. ROBB: Defendant's offer Dr. Sunding as an expert on water resource economics, your Honor.

MR. BLACKBURN: No objection, your Honor.

THE COURT: He will be accepted as that.

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BY MS. ROBB:

Q Dr. Sunding, did you do an economic analysis of the impacts that would result from a fresh water inflow requirement?

A Yes, I did.

Q Please describe your analysis, generally.

A Sure. The analysis concerns the economic impacts of changes in water availability to users in the GSA Basin, the Guadalupe San Antonio Basin, that would result from imposition of a minimum instream flow requirement.

Q And what did you choose as the minimum stream flow requirement in your study?

A Sure. The instream flow requirement that I chose was 1.15 million acre feet. And that corresponded, roughly, to the 1.3 million acre feet. It's actually somewhat less restrictive and, therefore, less costly than the instream flow requirement that TAP referred to in their notice. And I believe that was 1.3.

One of the issues was we needed monthly information on water availability. And the TAP notice was vague enough; it was just an annual number. So we needed monthly information on instream flows and water availability for, you know, consumptive purposes. So we used what's called the MaxH scenario from the FINS report, which again was a 1.15 million acre feet instream flow requirement. So it was in the range.

We had the monthly data, but it was somewhat less restrictive and, therefore, less expensive.

Q Please describe, in general, how you calculate the economic impacts of a reduction in water availability.

A Sure. Well, it's an incremental comparison of a baseline scenario, which would be no instream flow requirement, to a scenario that would occur with an instream flow requirement. We look out over some period of time into the future -- in this case we looked at to 2060, so over a 50-year period -- and calculate, essentially, two things.

The instream flow requirement reduces water availability, and then there are two consequences of that that I quantified in the analysis. The first is extra water supply projects, additional water supply projects, have to get built to fill the gap. And to the extent that the gap can't be filled by new water supply projects there are extra shortages or reductions in consumption that have to occur to have supply equal demand.

Q And what data did you use for your economic analysis?

A A combination of things. I could break it down sort of one -- you know, one piece at a time. A basic piece of information was the water demand projections from the Texas Water Development Board. That's in the regional water plan. Those are quite detailed. They project out demands by sector, by county and then at decadal intervals, again out to 2060.

THE COURT: Do they have new projects listed that you factored in?

THE WITNESS: Yes, ma'am. Yes, your Honor.

THE COURT: What were they?

THE WITNESS: Well, that would be the second source of information. And we could get into it now or I could, you know, get into it later on. But I have a listing of all the potential projects that were considered. So there is a -- to break it down into four categories, there was a whole list of potential projects that may be available to fill the gap and to meet projected --

THE COURT: What do you mean "fill the gap"?

THE WITNESS: Well, so you have an instream flow requirement that --

THE COURT: Okay.

THE WITNESS: -- reduces the amount of water that can be diverted. That's what I'm referring to as the gap. But then there's a gap that exists even without the instream flow requirement in that there could be population growth, demand is going up over time. And so even without the instream flow requirement there might be a need to invest in new water supply projects.

THE COURT: Such as?

MS. ROBB: Let's bring up Defendant's Exhibit 248. There's a list.

THE COURT: Does it have it on there? Okay.

BY MS. ROBB:

Q Dr. Sunding, can you talk a little bit about the projects that are included there?

A Sure. This is a table that's in the back of my report. This is also from the regional water plan for Region L (phonetic), which is the relevant region here. And you can see this is a listing of potential water supplies, the location, you know, general description of what they are. Most of them are ground water, but there are others that involve, you know, scalping of flood flows or seawater desalination, but most of them are ground water. Then the location of the use of, you know, the water produced by that project, the amount, a cost per acre foot, and then the date that project would be available.

Now, one thing we noticed immediately was that of the potential water supplies there are a number of them that would become infeasible if the instream flow requirements were to be imposed.

THE COURT: What's the GBRA Exelon Project?

THE WITNESS: That's for the power plant.

THE COURT: What kind of a power plant?

THE WITNESS: Nuclear. So, again, this is listed as being a future project. This is in the category of projects that I consider to be infeasible under the instream flow

requirements because --

THE COURT: With the other ones?

THE WITNESS: Yes. Because it's relying on surface water that would no longer be available. And the sum total of those projects --

THE COURT: What's the connection with the nuclear power plant and the Guadalupe River Authority?

THE WITNESS: Well, the nuclear power plant would use water, so it's factored into the demand projections. And the demand for --

THE COURT: Well, why is it a GBRA project?

THE WITNESS: Well, I think GBRA was going to undertake --

MS. ROBB: They're supplying the water. It's a contract.

THE COURT: Oh, so it's a money maker for GBRA.

MS. ROBB: Well, I don't know how much money is made from it, but it's a contract for water for the --

THE COURT: Well, how much are they selling it for?

MS. ROBB: How much are we selling it for? I don't think the price has been set yet.

THE COURT: Nobody knows? So that's why we're here is because of the power plant.

MS. ROBB: Um.

THE COURT: That's why you all put the little thing

there in the river to measure the flow?

MS. ROBB: No.

THE COURT: In connection --

MS. ROBB: -- the GBRA won measurement for salinity and flow, and other parameters was put there many years ago for study of the area to see what the parameters looked like. And GBRA is here because TAP has sued and --

THE COURT: TAP didn't sue GBRA.

MS. ROBB: No.

THE COURT: GBRA intervened.

MS. ROBB: We intervened --

THE COURT: I guess to protect this big project.

MS. ROBB: Well, we intervened to protect the water rights that GBRA holds.

THE COURT: Well, that's the big one, the GB -- the Exelon project. Well, somebody just testified that they were hired to evaluate a future wide use of GBRA. Was it Exelon?

MS. ROBB: No. No, your Honor, I do not believe that anyone has been hired to --

THE COURT: Do you remember that?

MS. ROBB: No.

MR. BLACKBURN: No, your Honor, I don't. I mean I certainly have some knowledge of all those projects, but I don't remember exactly what you're talking about testimony wise.

MS. ROBB: She's talking about the SAGES testimony.

MS. ROBB: Are you thinking of the SAGES report?

THE COURT: SAGES.

MS. ROBB: Okay.

THE COURT: SAGES report. They were funded by GBRA because of a projected water use. Was that Exelon?

MR. BLACKBURN: No, that was not. That was something else that had been, frankly, abandoned as of now and other projects have been brought forward instead of it.

MS. ROBB: That was a lower water supply -- river water supply --

MR. BLACKBURN: Lower Guadalupe water supply project.

MS. ROBB: Right. That, of course --

THE COURT: Do nuclear power plants do they consume the water or is it reusable? It's a coolant isn't it?

MS. ROBB: They need cooling water, yeah. Most facilities --

THE COURT: So is it reusable?

MR. BLACKBURN: Most is evaporated.

THE COURT: Oh.

MS. ROBB: Yeah. And that's true for a lot of generating facilities. It evaporates. So there is a water cooling parameter for most electric facilities.

THE COURT: Well, when you figured in the cost did you know how much they were selling the water for to the

proposed nuclear power plant?

THE WITNESS: So these are projects, your Honor, that don't enter into the analysis because they're not feasible in the --

THE COURT: Now or any other time.

THE WITNESS: With the instream flow requirement they're no longer feasible.

THE COURT: But if there's no water going to the Aransas Wildlife Refuge, then that's still feasible.

THE WITNESS: Then if it is feasible, we factored in the cost.

THE COURT: How much was the cost?

THE WITNESS: It's -- and this is actually the cost to build the project so as opposed to whatever --

THE COURT: The water thing?

THE WITNESS: -- you know, water rights might be sold for.

THE COURT: Okay.

THE WITNESS: Was I think $641 an acre foot.

THE COURT: Six hundred and forty-one dollars an acre foot?

THE WITNESS: Yes, your Honor.

THE COURT: Well, somebody knows. Thank you. Is that a lot? It seems like a lot of money.

THE WITNESS: Well, your Honor, it actually -- if you

look down the second to the last column, I wish that were a high number; but it's not I'm afraid. Sea water desalination, for example --

THE COURT: That's very expensive isn't it?

THE WITNESS: Very expensive. Cost in the order of two to three thousand dollars per acre foot.

THE COURT: Acre. And then where do you put the salt?

THE WITNESS: Well, the salt can be discharged back to the ocean or disposed of some other means, but it is an issue.

BY MS. ROBB:

Q So, Dr. Sunding, perhaps if we could just go back and re-cap on how you put together the economic model.

MS. ROBB: And then, your Honor, we have a few more tables that we can walk through to show you --

THE COURT: Okay, thanks.

MS. ROBB: -- the details.

BY MS. ROBB:

Q So you said that you identified the difference between the demand and the supply.

And what's your next step in putting the model together?

A Sure. So the first step in the analysis is really, you know, one of accounting to identify the counties and the times

and the usages for which there's a shortage as a result of the instream flow requirement. Then the question is what to do about it. And the model works essentially by allocating the shortage in the way that it will minimize economic loss.

So the first step in the model is to identify any surplus water rights in the county at that particular time. Those typically exist in agriculture. They'll have, say, rights to use more water than they're actually using. So the first step in the model is to take that surplus and use it to help alleviate the shortage.

The second step in the model is to allow transfers of up to 50 percent of agricultural ground water use to deal with the shortage that results from the instream flow requirements. That's a fairly aggressive assumption in the sense that it involves a lot of trading, a lot more than exists right now. But it is one that I think is fairly realistic.

THE COURT: When you do the water supply is it the permits -- is it allowable under the permit or what's actually used?

THE WITNESS: I believe this is what's actually supplied, so it would be the actual amount of water that would be delivered.

THE COURT: Not the total permitting.

THE WITNESS: So when -- you know, when we're calculating the shortage amount, I compare the permitted rights

to the actual amount of diversion. And if there's a surplus for any particular use in a county, the first thing I do is allocate that surplus to deal with the shortage. Because it didn't seem reasonable to me to have a situation where, you know, you'd have a very large shortage of industrial use and 50 percent surplus in agriculture. That just doesn't seem like an economically reasonable outcome.

So, in effect, what I did in this model is implement -- I'm sure you're familiar with the notion of cap and trade in the -- sort of in the climate change arena. This is essentially a cap and trade system for water. So it's using a market mechanism to minimize the economic losses that result from a shortage. So in that sense I think the numbers that I'll show you in terms of impacts are, in effect, lower downs. They're assuming that the shortages allocated as in cap and trade is efficiently as possible.

BY MS. ROBB:

Q Since we're talking about cap and trade and electrical losses, why don't we go to Defendant's Exhibit 266, and the third page of that.

And Dr. Sunding, what does this show?

A Sure. What this shows is the impacts of the instream inflow requirement on steam electric operations. Calaveras Lake is operated by City Public Service, which is the municipal electric utility for the City of San Antonio. There are a

number of power plants on it.

The operating permit requires a minimum operating level, which is defined as an elevation above mean sea level. And you can see what these curves are showing here. The blue curve is showing the percent of time under the baseline, so without the instream flow requirement that that lake level is sufficiently high, that it can be used for cooling. And it's, roughly, 95 percent of the time.

With the instream flow requirement that operating frequency drops down to, roughly, 45 percent. So you have essentially 50 percent of the time that lake can no longer be used for cooling the power plants that are around it. And that imposes significant economic losses.

Q Let's talk next about conservation. Did you take conservation into account --

A Yes.

Q -- in your analysis?

A Yes, in several ways.

Q Let's go to Defendant's Exhibit 247.

And Dr. Sunding, can you talk to us a little bit about how you took conservation into the analysis?

A Sure. The two basic ways that water conservation enters into the analysis are long-term purposeful conservation and then short-term emergency conservation to deal with drought events or water shortages that are acute.

With respect to the long-term conservation, there were conservation assumptions built into the basic demand data that I used from the Texas Water Development Board. On top of that I have additional conservation built into the model. I got this from HDR. This is extra water conservation primarily in the residential sector but other places, too, built into the model as I implemented it. And you can see by 2060 this adds up to something like 67,000 acre feet of conservation above and beyond what's already built into the water demand projections.

So, again, this is the long-term purposeful conservation, say, in the form of plumbing codes, water rate structures, incentive payments for adoption of efficient irrigation controls, or things of this nature.

Q So these would be actions that would be regulated, required to help close the gap between demand and supply.

A Yes. These would be applied primarily by the local water utility and there, again, long-term -- long-term conservation programs; and I assume full implementation of all of this.

Q All right. Let's go to Defendant's Exhibit 248. This lists potential future supplies of water.

Could you talk to us a bit about how you took this into account in your analysis?

A Sure. So I took this as being a list of potential projects netting out the 150,000 acre feet of new projects that are no longer feasible under the instream flow requirement. So

then I did two things. I looked first at which projects were economically justifiable in the baseline. And there's a number of water supply projects that would be sensible to invest in to accommodate new demand.

The second thing I did was to look at what projects are economically defensible or justifiable with the instream flow requirement. And not surprisingly that's a larger list. And that's the phenomenon I was talking about before where some projects make sense to invest in now to accommodate or mitigate the effects of the instream flow requirement. So that's one component of economic loss is the extra money spent on additional water supplies to deal with the instream flow requirement.

Q And then let's take a look at your conclusions. Defendant's Exhibit 245.

And Dr. Sunding, is this a summary of your results?

A Yes, it is.

Q Could you describe what it shows?

A Sure. You can see the table was just split in two. So this what we're looking at right now is the upper half of the table. What this shows, again, is economic losses we're looking out to 2060, so looking 50 years into the future. And remember I said a while ago that the economic losses are a combination of two factors: extra projects that get built so the money that's expended on that, and projects that wouldn't

get built in the baseline, and then extra shortage that happens as a result of the instream flow requirements.

So the first four lines up there show the shortage losses at decadal intervals. Remember these are annual numbers but they're expressed at decadal intervals. So shortage losses by sector, and then the next line involves future project costs. So this is extra money that's expended on water projects that wouldn't get expended in the baseline.

And so just to pick one number or one, you know, point in the future to illustrate this in 2020; so that's under 2020 demand conditions. The instream flow requirement would cause something in the neighborhood of $61 million in expected losses to the electric generating sector as a result of those changes in operating criteria that I showed a minute ago for Calaveras.

But the large share of the cost, the $185 million there, is related to the construction of the additional projects. So in that particular, you know, time snapshot about three-quarters of the cost is related to new projects and one quarter is related to extra shortage.

So then the very bottom number is the expected total loss that's in 2011 dollars. So it's controlling for inflation and it totals something like $251 million per year.

Q In conclusion, let's look at Defendant's Exhibit 253, present value of annual economic impacts. And can you describe

your conclusions to us.

A Sure. Much of the information on this table is, you know, related to what I just showed. The table before controlled for the effect of inflation, so everything was expressed in terms of 2011 dollars. This table goes a step further and performs a procedure called discounting, which is very common in economics and it reflects the fact that a dollar today is not worth as much as a dollar ten years into the future; it's worth something less.

And so what this table does is it puts future impacts into present value terms, what economists call present value terms; taking into account the fact that people are impatient, that they would rather have money now as opposed to money later. And when you add all that up, the annual impacts over a 50-year period, you come to a number of something like $6.7 billion in present value.

MS. ROBB: Pass the witness.

THE COURT: Thank you.

MR. BLACKBURN: May we take a short break, your Honor?

THE COURT: Oh, yes. Sorry. You can take a break, too.

THE WITNESS: All right. Thank you.

MR. BLACKBURN: We're going to make him stay up there.

THE MARSHAL: All rise.

(A recess was taken from 3:19 p.m. to 3:48 p.m.; parties present)

THE COURT: Thank you. You may be seated. Thank you.

Go ahead.

MR. BLACKBURN: Thank you, your Honor.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Dr. Sunding, Good afternoon.

A Good afternoon.

Q I'm Jim Blackburn and I think we met out in the hall and talked for a second.

A Yes, we did.

Q I have a few questions for you. I'd like to just start off with just sort of a couple of general type of issues.

You testified about a habitat conservation plan. I believe it was for the delta smelt; was that right?

A That's one of the covered species, yes.

Q And there's others as well.

A Oh, yes.

Q All right. And I think it was your testimony that the cost of that was something like about 25 billion; was that correct?

A That's a potential cost. The costs are still under

developments. But that's a potential number.
Q A rough ballpark figure. And I think your conclusion here is that given certain assumptions that you analyzed you estimated the cost of implementing certain types of flow protections for the whooping crane to being about $6.7 billion, right?
A In present value, yes, that's correct.
Q All right. And was California in present value as well?
A Yes.
Q Now, but you would agree with me wouldn't you that, you know, one, these endangered species issues are difficult to deal with. You would agree, in principle, they're kind of hard, right?
A Well, they can be. And from an economic perspective one of the -- you know, one of the things I'm continually struck by is that endangered species issues can pit the most vulnerable species against the most vulnerable people, whether it's farm workers or low income, low income citizens. Someone has to pay this cost. And in the present instance if the cost, say, gets passed through in the form of a higher electric bill or a higher water bill, that's a highly regressive tax. And that gets passed on to individuals and it hurts most at the lower end of the income spectrum.
Q On the other hand, there's a thing called full-cost pricing, which talks about the fact that there are certain

costs that are incurred that we're not paying for right now. So at least in some economic theory full-cost pricing, let's say, it makes sense to incorporate certain costs because we've just basically been subsidizing them with environmental damage, correct?

A That's correct.

Q Now, but you would agree for these types of struggles between a species that has been harmed by activities and by the economic activity over here that's generated, an HCP is a process that can lead to successful resolution of the dispute. Would you agree?

A Yes. There have been successful examples of HCP's.

Q A lot of it just depends on how you approach it and how you work through it, right?

A That's correct. There's a lot of negotiation that goes into an HCP, and there have certainly been examples of HCP's that have cracked up on the rocks of excessive costs.

Q And unreasonableness on both sides, correct?

A Yes, I would agree with that.

Q Now, I want to ask some questions and, frankly, I don't want to be overly critical because there's a lot about what you said that I, frankly, thought was quite good. But I do have a couple of questions.

One, you analyzed that our claim was for 1.15 million acre feet. And as I understood it, that comes off the top that

the bay gets that water before anybody else gets any water. Is that the assumption you made?

A Well, yes. And just to be accurate, your claim that I read was actually 1.3 and the instream flow requirement that was implemented in my modeling was 1.15, so somewhat less restrictive.

Q Well, that number was in the notice of intent to sue, correct?

A Yes, that's correct.

Q And did you look at the pleading that was actually filed?

THE COURT: Excuse me just a minute.

(Pause)

Go ahead. Thank you.

BY MR. BLACKBURN:

Q And my question was did you look at the pleading that was actually filed in this court case?

A I can't recall.

Q Where did you get the notice of intent? Was it sent to you by counsel?

A Yes.

Q And did counsel tell you that's what we were claiming?

A I read it. It seemed reasonable to me. I can't remember the specific discussions we had.

Q And did counsel also say we were wanting that water before anybody else got any water at all?

A Yes. I believe that's the way it's implemented in the -- we had the water supply analysis conducted by the use of the WAM model, which there might have been testimony about already here. And I believe the environmental flows have a higher priority.

Q In Texas? That's your thought right now?

A No. I believe the way the model was implemented the environmental flows have a high priority.

Q That was implemented by your counsel team, right?

A It was implemented by HDR.

Q That would be -- HDR would be the engineering firm that testified yesterday, and they do a lot of work for, among others, GBRA.

A Yes, that's correct.

Q And GBRA is your client as well.

A Yes, that's correct.

Q All right. So you were given information that they prepared, and they said here is what we're projecting; go analyze the economic impact, correct?

A Yes.

Q And you didn't read our pleading to see what we were actually asking for, correct?

A Let's assume that, yes, correct.

Q I mean the counsel for the other side didn't send it to you, right?

A I actually don't remember if I read it or not. I know I looked at the notice, but I don't remember looking at the pleading.

Q How about our expert witness's testimony about remedy? There is a man named Dave Frederick who wrote about habitat conservation plans.

Did you read his expert report?

A I don't believe so, no.

Q So they didn't send you that either to analyze, correct?

A I really don't remember if they sent it to me or not.

Q And there's a guy named Andy Sansom (phonetic) came in and testified about something called a recovery implementation plan and about a balancing process to achieve consensus on how to meet water needs and that that might be something that could be implemented in this Court's -- if this Court would agree with the Plaintiffs it might be a remedy that would be appropriate.

Did your counsel send that to you?

A Not that I recall.

Q And there is testimony from Dr. Sass, whose analysis of whooping crane damage is focused on the last six months of the year in terms of inflows rather than an entire year's worth of inflows.

Did you see that?

A No.

Q And are you aware that if Dr. Sass's concerns were

addressed and if inflows were provided only during the last six months that that would reduce the amount of water down to about 400,000 acre feet? Are you aware of that?

A No.

Q And if you were analyzing the impact of providing for a 100,000 acre feet at a particular time of the year rather than 1.15 million at the beginning of the year, it would make a lot of difference in your analysis wouldn't it?

A It potentially could, yes.

Q And I'm not being overly critical that you didn't do those things. I just want to point out that there may be aspects of this case that you're unaware of. And it seems that you were, correct?

A Again, I think I was clear about what I used as an assumption. It was the MaxH inflow scenario.

Q But you made no assessment as to whether, in fact, that was really what we were asking for and what we have filed and presented to this Court, correct?

A Again, what I saw in the notice was quite vague. There was the 1.3 million number. The inflow requirement and MaxH is 1.15, so it seemed reasonable. But, no, I didn't conduct a detailed analysis of that.

Q Now, did you do any balancing analysis? For example, environmental harm did you make any analysis of the impact that is currently occurring under historical flow scenarios when the

salinities rise to certain levels?
A Not the way you just described, no.
Q And did you make any analysis of if there's full use of all those water rights that you talk about as being so valuable economically, if they're fully utilized what harm that will do to the bay system and to the whooping crane?
A No, I did not analyze that.
Q So you made no attempt to sort of be fair and to be balanced, but you were just finding the cost side of the equation, correct?
A There are economic values you could think of it as being on either side of the ledger. And there are definitely benefits that would result from the instream flow requirement.
Q But you didn't consider those in your analysis.
A Well, no. The focus of my analysis was on the economic implications of changes in water availability resulting from the instream flow requirement.
Q But part of those economic implications are that there would be benefits, right?
A Yes.
Q But you didn't consider those because GBRA didn't ask you to?
A That wasn't the question that was posed to me.
Q That's right. It wasn't in the scope; it's not your job, right?

A Right. Although I would say I did a number of checks. Once I got the results I did a number of checks to see how they compared to other magnitudes in the economy just to make sure that they were reasonable.

Q Did you check out how much money is made off of shrimping, for example, in the San Antonio Bay complex?

A I did check some information related to the economics of the coastal economy in Texas.

Q Yeah. Did you run -- did you come up with a conclusive number about what benefits would ensue if, for example, greater protection was afforded to the coastal estuary?

A On an incremental basis, no. I have information on the size of the coastal economy relative to the rest of the economy in the --

Q But you didn't factor it into the analysis that you're presenting to this Court today.

A I did not calculate incremental benefits, that's correct.

Q And just out of curiosity, economists have a lot of trouble computing the value of something like a whooping crane, right?

A It's gotten a lot of attention in the academic literature. It's a challenging problem.

Q So you can't tell me what the value is of somebody going out and for the first time seeing a whooping crane feed a crab to a juvenile can you?

A There's information in the academic literature on what we call, maybe not as dramatically as you just described, but we call non-use values in environmental economics, what are economic benefits that result from just the existence of a species as opposed to direct use of it. And there is some information in the academic literature on that.

Q Now, the individual project -- well, you say there's value; there's information.

But you didn't include that in your analysis, correct?

A Well, no, I did not do an incremental benefits analysis of that question.

Q So there are certainly aspects that could be -- if you were doing a fair and balanced analysis would be added to the other side of the ledger to at least begin to offer some dollars on the other side, so to speak.

A Well, I think if one were doing a comprehensive analysis, yes. There's some information that could be brought to bear on the other side of the ledger.

Q It would be fair to say you were not doing a comprehensive analysis.

A No, I did not look at the benefits that would result from the instream flow requirement.

Q Now, with regard to individual projects did you make any assessment of whether the future projects were at all likely to

occur?
A Yes.
Q Okay. Exelon requires a nuclear regulatory commission permit.
Do you know what the status is of that at this current time?
A Not the specifics but I believe it's, more or less, on the shelf.
Q And do you know if it is a permit application for a fully operational plant or for a site reservation? Do you know?
A Don't know.
Q So you don't really know that anything you put up on your chart is actually likely to happen in that future project scenario, right?
A The goal there was to use the best publicly available information, so that was the information that was contained in the regional water plan.
Q And the regional water plan, do you know anything about the regional water planning process? For example, is it in Region L or Region N? Do you know?
A It's Region L.
Q Oh, good. You get a check mark.
In the Region L planning process do you know if those are projects that are --
THE COURT: I think he's going to get a check whether

you give it to him or not.

(Laughter)

MR. BLACKBURN: I was trying to be nice.

THE COURT: No, you weren't.

BY MR. BLACKBURN:

Q With regard to the Region L planning process do you know whether, in fact, once a project is on the Region L plan whether it is targeted for construction or not?

A I don't believe so, no.

Q You don't believe you know or you don't believe it's targeted?

A I don't believe it is targeted for construction.

Q Okay. So would it be fair to describe it as a list of possible projects?

A Yes. That was my understanding.

Q Okay. So --

A And that's reasonable considering it's looking out 50 years.

Q On the other hand, you assumed every one of them is going to happen, right?

A No, I did not.

Q Which ones did you not assume?

A If you want to go through specifics, if you put up the table I could show you.

Q Okay.

THE COURT: Is it 247 Defendant's exhibit?

MR. BLACKBURN: This is 248 --

THE COURT: 248.

MR. BLACKBURN: -- the one that we're looking at.

BY MR. BLACKBURN:

Q Words off of a read chart; happened, not happened?

A Well, if I could just explain the method first and then I'd be happy to go through --

Q Well, that -- well, okay, I'll be nice. Go ahead and explain your method.

A No. If you want a specific answer to that, you need to go to the next table.

Q That would be 249?

A Table 5 in the report.

Q Table 5. These are the projects that you assumed would occur, right?

A I wouldn't characterize it that way. The previous table, Table 4, was as you described a list of potential projects. Now, the screening analysis that I performed was essentially an economic analysis. There are many of these projects that I can tell you I don't think would necessarily make economic sense in that they would have costs that exceed their benefits.

THE COURT: Such as?

MR. BLACKBURN: Would you go back to the previous page?

THE WITNESS: Well, we...

THE COURT: Is that the one?

THE WITNESS: So this is the list of potential projects that are listed in the regional water plan. And then on Table 5 was the list of projects that I concluded would be economically justified, would pass a benefit cost test.

BY MR. BLACKBURN:

Q So you assumed all of these projects would not happen?

A No. These are all projects that could happen.

THE COURT: The yellow ones?

THE WITNESS: Yes, your Honor. No, everything on the list here is from the regional water plan. So these are all projects that could happen.

THE COURT: Which ones did you think were not economically beneficial?

THE WITNESS: Well, we have to go through a comparison. Now if you go to Table 5.

MR. BLACKBURN: Go ahead.

THE WITNESS: We would have to go through line by line. So these are the projects -- and you can see this is a small subset. These are projects that, in my judgment, were justified based on cost benefit grounds.

BY MR. BLACKBURN:

Q So there's a number of lower basin projects that did not pass benefit cost analysis by your evaluation?

A Well, just to be clear, the projects on the previous table that were in yellow --
Q Right.
A -- those were removed -- or I'm sorry, excuse me. These are projects that are under baseline conditions, so this is without the inflow requirements.
MR. BLACKBURN: I'm sorry. Would you go back to the previous table, please, on 248?
Q I don't understand yet. Did you assume for purposes of your impacts, costs, you know your cost calculations, were these projects in this -- the GBRA mid basin project, GBRA lower basin, GBRA new appropriation, storage above canyon (phonetic), CRWA Senior, Wimberly, Woodcreek, GBRA Exelon, those projects; did you assume they happened -- that they passed the benefit cost analysis or not?
A I did not assume that they passed the benefit cost analysis.
Q Did you evaluate them from that basis?
A Yes, I believe I did.
Q So you evaluated and found that they wouldn't pass a benefit cost test if what?
A So under the baseline, so without the inflow requirements, under the baseline, their demand projections -- and there's hydrologic variability. So the test that I performed was to look at the driest year on record, which I believe is 1956,

calculate the benefits from those projects to the extent that they alleviate shortage, and then compare them to the amortized costs.

Q And on the basis of that you found these projects were more costly to implement than they would generate benefits.

A Well, you'd have to go to Table 5 and look at the list of projects that passed the --

Q If these projects are not on this list they didn't pass, right?

A Right. Although, you know, I have to just stop for a second and I'm not -- this might be an issue of how the table is constructed. What I think we did is evaluated everything that was potential but...

Q As you sit here today your testimony is the Table 5 projects, which would be DX249 I believe, that these Table 5 projects are the ones that you think are likely to happen under baseline conditions.

A Yes, that's correct.

Q And before any flow restrictions were imposed all the other ones don't happen by your analysis.

A That they -- yes, that they would not pass a benefit cost test.

THE COURT: Okay. So did you take those out of the 6.7 billion?

THE WITNESS: Well, your Honor, so these are projects

that would be built in the future under -- or without the instream flow requirement. Then the next table shows the projects that would pass a benefit cost test with the instream flow requirement.

BY MR. BLACKBURN:

Q And this is when you're assuming we get all the water for the bay first.

A Yes.

Q And you know if that's an untrue assumption, then your analysis would not be correct, right?

A Yes. That's my understanding of how the WAM was implemented.

Q Right. The WAM was done for you by another consultant who we have skipped in the interest of time here, and that consultant gave you some input based upon the assumption that 1.15 million acre feet got taken off the front end.

A That's correct.

Q And 1.15 million is taken off the front end, then whatever was left -- and there's been many years that there's nothing left -- then that was what was analyzed, right?

A That's correct.

Q But you've analyzed nothing where we were reasonable. And we said we'd just like some water for the whooping crane, we don't want it all, and we'd only like it sometimes a year. You didn't analyze anything like that, right?

A No intermediate scenario like that, no.
Q And so if, in fact, I will represent to you and the Court we're looking for something less than 1.15 million acre feet on the front end, your analysis wouldn't apply to our request, correct?
A Sure. If the instream flow requirement is different, then the results would be different.

MR. BLACKBURN: And I will make that representation. Pass the witness.

MS. ROBB: No more questions.

THE COURT: Thank you, sir. You may step down.

(Pause)

MR. COOVER: Your Honor, the State calls Margaret Hoffman.

(Pause)

THE COURT: How are you?

THE WITNESS: I'm great. Good to see you.

THE CLERK: Please raise your right hand.

MARGARET HOFFMAN, DEFENDANTS' WITNESS, SWORN

MR. COOVER: May I proceed, your Honor?

THE WITNESS: It's good to see you again.

THE COURT: It's good to see you.

THE WITNESS: Good to see you.

THE COURT: Are you in Austin now?

THE WITNESS: I retired in May.

THE COURT: I guess I'm about to find out.

THE WITNESS: I retired in May and I moved to -- I have a little place outside of Georgetown so I'm doing that. I think I'll go back to work but right now I'm having fun.

THE COURT: Well, good to see you.

THE WITNESS: Good to see you.

DIRECT EXAMINATION

BY MR. COOVER:

Q Now, Ms. Hoffman, it sounds like you two are already acquainted, but just for the purposes of the record could you introduce yourself to the Court, please?

A Yes. My name is Margaret Hoffman.

Q And where do you reside?

A I reside in Jonah, Texas, which is about 30 miles northeast of Austin.

Q And before we get into it I just want to make sure.

Up here on this projector is that a true and correct copy of your resume or your CV?

A Yes.

MR. COOVER: And your Honor, that's Defendant's Exhibit 299.

Q Now, Ms. Hoffman, are you currently employed?

A I am still on retainer to my last employer, which was Chevron Corporation. But I don't go in the office every day. They just consult me when they need to.

Q Okay. So would you say you're retired or semi-retired?
A I'd say I'm retired.
Q Okay. It's a common theme in this --
A I'm drawing retirement.
Q Now, before you retired you said you worked for Chevron Corporation?
A Yes.
Q Could you describe your duties there at Chevron?
A I was the chief environmental counsel and my duties changed a little bit over time. They didn't have a chief environmental counsel or an environmental law organization before they recruited me, and they recruited me specifically to create one. So I did that, you know, the first couple of years that I was there. And then essentially my duties were to supervise the lawyers and other personnel in that group, make sure that the group had the correct expertise to cover all the environmental issues that confronted the company both in the United States and around the world and to have a -- to handle some matters, more sensitive matters or whatever, myself.
Q So was it an advisory role or supervisory role or both?
A All of that.
Q Okay. If we could, Ms. Hoffman, I'd like to back up just for a second and talk about your educational background. Let's just start with your undergraduate studies.
A I have a B.A. from Trinity University. I graduated in

1970.
Q And after that?
A After that after taking off a year-and-a-half to do some public service work I went to law school. I graduated from St. Mary's with a J.D. in 1975.
Q Okay. And then after law school?
A I spent one year of clerking for Chief Justice Bert Tunks of the Fourteenth Court of Appeals in Houston, and then I moved to Corpus Christi and went to work at the law firm Wood, Boykin & Wolter.
Q And how long did you stay in private practice?
A From '76 through the end of '91 with that firm.
Q Okay. And then in 1991 what happened in terms of your --
A I left the firm at the end of the year and spent a year getting my LLM or studying for my LLM in environmental law at the University of Houston. And I got that degree in January of '93.
Q And could you just elaborate a little bit on that LLM degree. You said "environmental law."
Did you study water law, in particular?
A That was my area of concentration, yes.
Q United States water law, Texas --
A Texas water law.
Q Okay. So after receiving your LLM degree --
A And United States water law, because the Coastal Zone

Management Act was involved, too, so --
Q Okay. So both.
A Both.
Q After the LLM degree what happened -- where did you go next?
A I started working in the fall of that year for the TNRCC, the Texas Natural Resource Conservation Commission, which is now the TCEQ.
Q Okay. In what capacity were you first employed at TNRCC?
A I was a staff attorney.
Q What does a staff -- well, what were your duties there at TNRCC as a staff attorney?
A As a staff attorney I worked both in the air program and the water program. I briefed legal issues that the executive director asked to have briefed. I did some legislative work just because I had had some experience in doing that before. But essentially -- and then also staff attorneys and I was assigned to particular contested case hearings to represent the executive director in the hearings. I was not a staff attorney very long so I'd never actually conducted a -- represented in the hearing, but I did at least -- I did the preparation.
Q So you say you weren't a staff attorney very long. It sounds like you got promoted?
A I got promoted really fast, but it was more due to politics than to my stellar qualifications. I was --

Q Don't sell yourself short now.
A Well, that's true. I'm testifying.
THE COURT: That's how a lot of us got our jobs.
(Laughter)
That's how it works.
THE WITNESS: I was a staff attorney for about six months and then the position of senior water attorney became available and I got that job.
BY MR. COOVER:
Q And what were your duties as a senior water attorney?
A That job is a smaller version of all the jobs that I've had there after -- meaning that you have the supervisory responsibility over the staff attorneys that report to you, plus you do actual legal work. I did not -- when I was there in the executive director's office the senior attorneys did not actually go to the hearings and represent the ED but they had the oversight of the preparation and conduct of those hearings.
Q Okay. So how long were you -- how much time did you spend as a senior attorney?
A I would say about two to two-and-a-half years.
Q And after the end of those two-and-a-half years what happened? Did you get promoted again?
A Yes. The next level up is director -- what is it...
Q It looks like director of environmental law division.
A Yes. I'm sorry. The executive director law staff has

three divisions, and the person who is the director of the environmental law division, I can't remember whether they left or whether they got promoted. But I applied for that job and got it.

Q And your duties as director of the environmental law division?

A Similar but bigger. When you're the director of the law -- of the environmental law division you have the supervisory responsibility for the air section, the water section, the waste section. There's about five sections in there that have senior attorneys, and the senior attorneys report to the director of the environmental law division.

Q Okay. And then after directing the environmental law division what came next?

A Next is -- was deputy executive director for the law department, which that -- so then I had the supervisory responsibility for the environmental law division; the general law division, which is things like employment law and state procurement and enforcement. Those are the three divisions in that office.

Q So staff attorney, senior attorney, director of environmental law division, and then director of office of legal services.

A Right.

Q You had just about every position they had over there.

A Yeah, I pretty much tried them all out.
Q Now, in each one of those positions did you deal with water policy, water law on a regular basis?
A Yes. You know, it was known to the people at the agency that I had a concentration in water law and had done water commission work before I came, even before I went back to school.
Q Okay. And going with the common theme, I'm guessing that after you spent some time as director of office legal services you got promoted again.
A I did. The executive director left and I applied for that job and was appointed.
Q And we've already heard from Mr. Vickery, the current executive director who spoke about the executive director's day-to-day duties, but if you could just briefly tell us about what your experience as executive director of TCEQ was like.
A Well, the executive director has a lot of both statutory and just, you know, in commission procedure obligations. It's a very, very large staff and the executive director is responsible for everything that the staff does, basically. So and a lot of that is budget, it's administration of federal programs that, you know, the commission gets grants to administer certain programs. There's a lot of personnel stuff. There's a lot of political. You're constantly being contacted by members, members' staffs, the governor's staff, various

organizations and lobbyists.

I would say that as executive director I spent at least half and maybe more than that of my time just meeting with people who wanted to get the ear of the executive director, especially on matters that would be adjudicated by the commission because they couldn't go and talk to the commission about it when there was a live matter. So they came and talked to me.

Q Now, it sounds like you -- you know, executive director has a big administrative role, but did you have cause to use your legal training and your legal expertise at all?

A I did in all those jobs. The commission has -- in the state of Texas has big issues. The first one, for example, was that it was very important to the legislature that Texas get the delegation from the federal government of the water quality permitting program. Texas had been trying to negotiate that with EPA for 25 years, and that was my first thing was: Okay, Margaret, go up to Dallas and get NPDES delegation. So I -- you know, I worked on that; that was my case I guess you'd say.

We also, the state of Texas has water disputes with New Mexico and with Old Mexico, and I worked directly with the then chairman of the commission working on those. So, you know, both as a lawyer and as executive director with a law degree I did a lot of what I would call negotiation work, legal work.

Q As executive director did you help or did you work with TCEQ in participating in the legislative process at all?
A Yes.
Q Could you elaborate on that?
A Yes. The legislature and the governor's office and the lieutenant governor -- but he's in the legislature -- consider the executive directors, the commissioners and the staffs of all the state agencies as a resource for them when they're creating legislation or amending legislation. All the years that I was -- except maybe for the very first one all of the session years that I was with the commission I spent most of the session actually attending hearings, testifying in hearings, meeting with legislative staff over primarily water legislation but other legislation that affected the TCEQ's business. So it was that -- in session years that was a very major part of my job.
Q Okay. Now even though it's -- you said you left the commission in 2004?
A Yes.
Q Now, even though it's been a few years, you know are you aware of any major statutory changes to the way TCEQ does its business?
A Not procedurally. You know, I am aware that Senate Bill 3, for example, has come along and there were some new things in the Senate bill. But I think procedurally it's

pretty much the same.

Q Now, Ms. Hoffman, based on your educational background, all your legal trainings, particularly your experience there at TCEQ, do you consider yourself to be an expert in Texas water rights, Texas water policy and TCEQ policies and procedures?

A Yes.

MR. COOVER: Your Honor, I offer Margaret Hoffman as an expert in Texas water rights, Texas water policy and TCEQ policies and procedures.

MR. BLACKBURN: I have no objection, your Honor.

THE COURT: Then she's accepted.

BY MR. COOVER:

Q Now, Ms. Hoffman, you have a general understanding of why we're all here today, what this lawsuit is about?

A Yes. My understanding -- I did read the petition. And my understanding is that the Plaintiff's position is that actions of the TCEQ have either harmed or harassed the endangered species, whooping cranes.

Q Okay.

A And redress is being asked for that.

Q It's gotten a lot more complicated than that, but that's a very -- I think that's a good general statement.

Now, and you're aware that former Commissioner Larry Soward has submitted an expert report and testified in this matter?

A Yes. I read his report and I listened to the recording of his testimony.

Q Now, in reading Mr. Soward's expert report and in listening to his testimony do you agree with his opinions regarding -- all of his opinions regarding TCEQ's regulatory authority?

A No. I think there's a fundamental foundational concept that is skipped in his report, and that is, that unlike all the other permits that the commission issues, a permanent water right is a right -- is a vested real estate right and, therefore, the commission is constrained by that and by the several places in the Texas Water Code where the commission is instructed -- I think 11.001 says nothing in this Code shall affect vested private rights in water. So and Mr. Soward's report does not take that into account or explain how some of the -- most of the suggestions that he makes for how to get water out of water rights holders and into the stream don't address that.

Q Now, in Mr. Soward's expert report and in his testimony you heard him talk quite a bit about some provisions in Chapter 5 of the Water Code.

Do you have any opinion or do you have any knowledge of what TCEQ's sort of view or use of Chapter 5 was in relation to other provisions of the Water Code?

A Generally speaking -- and let me do just a little backing

up, background. The commission and the executive director, these are issues -- instream flows, bays and estuaries, environmental set-asides, et cetera, these are issues the whole time that I was there. I mean we dealt with these all the time. We got various petitions, ideas, requests, and certainly when the legislature was considering it. And so we looked at our -- when people would say, well look, you know you could do this or you could do that, we always carefully reviewed the law. There's a couple of just some -- of real basic things. One is that Chapter 5 is general and Chapter 11 is specific to water rights.

Q Now, let me stop you right there.

Was it your experience that -- did you ever -- in your time at TCEQ did TCEQ tend to use general applied authority as basis for permitting decisions, in your experience?

A No. Our policy in the executive director's office, and I think it was without exception followed by the commission, was if all you have to cite is Chapter 5, you probably are barking up the wrong tree.

Q Where should you be looking?

A You should be looking at Chapter 26 if you're doing water quality, you should be looking at Chapter 11 if you're doing water rights, you should look at the Health and Safety Code if you're doing waste, et cetera.

Q Now, Ms. Hoffman, I heard you talk about these permits being treated as a vested property right. Could you talk for a moment -- I don't think we've had any testimony elaborating on permanent water rights as compared to other water rights commission issues.

A Well, it's a term of art. A permanent water right it can only be acquired by adjudication or commission permit. And it is -- you know, it's defined in the Code as being an easement, which is a property right. Fee simple isn't the only kind of property right, obviously; we all know that. So it's defined there as a property right.

Now, the commission does issue other permits, for example, it issues term permits. And term permits are specifically provided for in the Water Code, and a term permit is for a term of years. It's usually around ten, but it can be -- you know, there's no legal specification. And that is for someone who wants to get a permit to use water that's actually been permitted to someone else but that person or entity has not used the water, is not using the water and isn't expected to use it during the term.

There are also temporary and seasonal permits. Temporary permits are more for individual projects, somebody is building something and they need some water so they get a -- they request a permit for a certain number of acre feet of water. Seasonable permits are based on -- some of those are

agricultural. That's one way for agriculture to get some water when they don't have a permanent water right.

But both the Code and the commission rules are very clear that those are like the other permits, water quality permits, air permits. Those are not vested rights and they are subject to being canceled or otherwise re-visited by the commission.

Q And we've heard some testimony about the prior appropriation system and the way that works in Texas. And if you could, talk a little bit about how a seasonal term and temporary water rights or permits kind of fit into that pecking order with the permit water wrights.

A They're very -- at the bottom of the pecking order. And I believe that Mr. Soward also mentioned it's the -- the executive director, the watermaster and ultimately the commission go to those permits first when it's -- you know, when there's not enough water to go around. And in the years that I was there there may have been a couple of years when we didn't send out any cease and desist letters to junior water rights holders and term permit holders. But we usually by the time you got to September, August or September, there was usually water shortage. And if you had a downstream -- well, or if you had any, but downstream -- if you had a downstream senior water right that called for water or you had downstream domestic and livestock users who called for water, the

commission would send those letters.

In addition to that if -- you know, the highest priority for use in the Water Code is for municipal and domestic uses. And if municipality was in danger of running out of water, especially in the watermaster areas but elsewhere as well, those term permits and seasonal permits were very often told to not take water.

Q And you touched on an interesting subject and one that we've heard quite a bit and one that Mr. Soward talked about, is times of shortage or times of emergency.

What are some things TCEQ can do in terms of regulating or administering water rights in times of emergency or times of shortage?

A Well, the Code uses the word "times of shortage" in the watermaster -- in the statute in the part about watermasters. I'm not sure that I know what an emergency is. I think only the commission knows and it probably calls it on a, you know, case by case basis.

But what the watermaster can and does do during times of shortage, his primary responsibility is to protect senior water rights so -- but he can take less drastic actions than just telling somebody they can't have water. Because a lot of water supply has to do with where the diversion is taken. He can request and, you know, use his position kind of as a bully pulpit. I don't think we've ever litigated. But he -- you

know, he can ask a senior water rights holder to move his point of diversion, to take his water at a different time, so as to manage the stream because of -- you know, there's carriage losses, there's -- it's a real -- I know this is a pun, but I don't mean it that way -- it's a real fluid situation. You know, every day the watermaster and his deputies are checking all their points where they monitor, and literally things can change day to day.

Q Ms. Hoffman, can TCEQ ever act sua sponte or on its own in terms of creating a water right?

A No. There has to be an application. The commission has very few opportunities, legal opportunities, to act just on its own motion. Adjudication is one of those. The commission can say, okay, you know, we're now going to adjudicate such and such basin. Although I think all the basins are now adjudicated, so that's not going to happen. But generally speaking, if you look at all of the sections that both Mr. Soward and I have cited in our reports, they all deal with what the commission can do in response to an application.

Q Ms. Hoffman, are you aware of any -- and I'm kind of skipping around -- but are you aware of any specific TCEQ or specific legislative authority that could allow TCEQ to require a reservoir owner to release stored water?

A No. If it's already been appropriated, I don't think they could order the release. Because once it's appropriated and in

the possession of the water rights holder the commission really does not have the authority to take it back even for senior water rights I don't think.

Q But what about in times of -- again, back to in times of shortage. What about requiring or allowing -- or requiring reservoir owners to allow inflows to pass through that it would otherwise normally be allowed to divert?

A If there's a senior water rights holder downstream or D and L interests that are being impaired, the commission can order that. But it has to be to protect senior water rights. I think there are three things listed: Senior water rights; exempt users, which generally is domestic and livestock users; and other inflows that the commission has determined necessary.

Q Instream flow requirements. Is that it?

A Right.

Q But are those it?

A Yes.

Q Now, Ms. Hoffman, we heard referred -- Mr. Soward and a few other witnesses talk about cancellation of unused water rights. Could you elaborate on that?

A Well, and that is a subject also that came up regularly while I was at the commission. There's a couple of things about canceling water rights. And I'm not aware -- I think that one -- I think that one cancellation case was filed while I was there and I don't remember what happened.

But it's very difficult to -- one of the things that was determined by the -- you know, in the commission and the general counsel and the ED's counsel when we talk about this stuff, you have a limited ability to -- and limited resources. It's very difficult to mount a case where you have the burden of proof to show that someone has -- that for every day of the previous ten years someone has not taken water. Now, it's possible that in a watermaster stream you might be able to establish that.

From the point of view -- and, you know, a lot of times generally speaking it's not environment groups like the Plaintiffs who would push cancellation of water rights. It would be people who want to appropriate the water for industrial, municipal, you know, the human uses. So you know we took the view, especially since the legislature had -- the other thing is that the legislature specifically provided for the term permits, which means that the legislature contemplated that some people who have water rights permits are going to take a certain amount of time to get up to speed and start taking their water and the legislature does not disapprove that, has not outlawed that.

Q Do you have an opinion as to whether -- as to what the impact of some sort of big cancellation program would have on instream flows in the river? In other words, would it --

A Well, I'm sure it would decrease them. Because if the

water hasn't been being used for ten years, it's been in the stream for ten years. And if it becomes available for appropriation, say for example, you free up the water, well the highest -- the highest priority for water permitting under the Code is municipal and domestic use. So if you have competing applicants for that water, what you've got is somebody is going to start taking it out of the stream.

Q Now, Ms. Hoffman, is there anything in listening to Mr. Soward's testimony and in terms of his expert report, is there anything that in terms of a creative solution the Court might need to know about or want to know about that hasn't been put on the table yet?

A Well, the commission along with Parks and Wildlife, and to a certain extent the development board, the commission has the ability to -- certainly has the ability to be creative in remedies when it's got a permit or rule violator enforcement.

Q Are you talking about supplemental environmental projects?

A I'm talking about supplement environmental projects. I'm talking about donations either purchased and donated or donated to the Texas Water Trust. One of the really -- you know, steps came into being while I was at the commission, and I was very interested in them. And we did some really good projects.

I don't know if everybody knows this, but unlike in California, in Texas when you pay a fine to the TCEQ because you've -- or you pay a fine because you violated your air

permit, that money does not go to the environment, it doesn't go to the agency. It goes into the general fund at the state.

So from the point of view of the environment, if you can do a SEP that benefits the environment, that has -- that has been the policy of the commission all the time that I have been there that that's a good thing to do. I mean they have rules and limits, but if you can think of a creative SEP -- and SEP's can be -- they don't have to be just one person and one violation. You know, you could set up like a mitigation bank, which we use mitigation banks in some cases, too, where you know if somebody has a $50,000 fine, they put half of it into the SEP; and somebody else has a $500,000 fine and they put half of that in the SEP; and eventually you've got some money there. And you can buy water with it or you can -- you know, whatever the plan is.

My experience has been that the commissioners have been pretty liberal in the approval of SEP's that have a good scientific foundation.

Q In your experience with the private sector working for Chevron, do you have a sense of, you know, what we call industry, what industry's perspective is on supplemental environmental projects? Are they favored or disfavored? Not that --

THE COURT: Well, they don't have to pay them.

//

BY MR. COOVER:

Q Well, right. And not that Chevron would ever be enforcement for any reason --

A That we would ever have enforcement. Interestingly enough, I as involved in negotiating with the state of New Jersey a SEP that was related to ground water damage that had been caused by a bazillion leaking gas stations. I mean everybody knows every gas station that ever existed has leaked into the ground water. And so we settled on 600 sites with New Jersey by doing a SEP that had a combination of things. We bought some property that the state was interested in having for an environmental easement and gave it to the state. We provided funding for some water quality projects. We actually funded the bay keeper there -- or I guess it's the river keeper in New Jersey. Even though they don't like industry they were -- you know, there were -- even they were glad to work with us on the SEP. And I think that was the most -- the biggest SEP that I worked on at Chevron.

But, of course, you know industry even though you might not think so, they're pretty sensitive when they -- especially a company like -- a big national, international company is pretty sensitive about their reputation. And also they want to -- they want to be friends with the people where they operate. So they're in favor of SEP's.

I mean we in that New Jersey project, for example,

Chevron spent much more money on that SEP than we would have paid as either damages or fines to the state of New Jersey. But we gave them specific stuff that they really wanted.

Q Now, Ms. Hoffman --

THE COURT: How much did it cost? Or is that secret?

THE WITNESS: It's not a secret. I'm not sure how much it is. I think it was about $5 million. It was not spare change. It was a substantial amount.

BY MR. COOVER:

Q Ms. Hoffman, I'm about at the end of my questions for you, but I do want to reiterate just because it's an important point for the Court to understand.

Are you aware in your experience at TCEQ of any specific legislative authority to curtail an existing water right or take it away?

A Only what we've discussed as far as cancellation. And it's not taking it -- you know, enforcement when you're enforcing against a junior in favor of a senior, that's not taking anything away; it's just enforcing the system.

MR. BLACKBURN: Pass the witness, your Honor.

THE COURT: Good job, Mr. Coover.

MR. COOVER: Thank you, your Honor.

MR. BLACKBURN: I'll second that.

THE COURT: It looks like you've been doing that for years.

THE WITNESS: Good genes.

CROSS EXAMINATION

BY MR. BLACKBURN:

Q Good afternoon, Ms. Hoffman.

A Good afternoon, Mr. Blackburn.

Q I really don't have a lot of questions for you, although I have some. I guess first of all, you read and heard Mr. Soward's report. And let's -- you know, Chapter 5, for example.

And I think as you said, the interpretation of Chapter 5 is essentially a policy issue, correct?

A Well, it's a legal issue, too; but, yes, it's certainly a policy issue.

Q Well, I think you described it as a policy issue, and I think you said that in the past the policy was you just chose not to rely on Chapter 5, correct?

A I would say that, generally speaking, we looked very hard at something that we felt like we had no authority for other than just broad, general authority. And one of the reasons for that is because that section of Chapter 5 it uses the same words a couple of times. But the point of it is that the commission can take whatever appropriate actions can be implied in law in order to do -- in order to carry out its jurisdiction.

Well, in the case of hindering vested water rights

the commission doesn't have jurisdiction to do that, so actually that section wouldn't apply to requiring senior water rights holders to forfeit their rights or, you know, delay their rights or any of that.

Q Well, you have said a whole -- I mean you have quite a lot that you are concerned about with regard to these so-called usufructuary rights, correct? And that is a particular subset of right, correct?

A Once again, the Code refers to water rights as vested property rights in the nature of an easement.

Q Right. But --

A And once the grantor of an easement has granted the easement and he no longer has the authority to prevent the holder of the easement from using it unless they violate the contract or, you know, whatever.

Q It's never been interpreted that way has it?

A What?

Q Can you give me a single case that compares it to an easement?

A It's the language of the statute.

Q Usufructuary right is a right that is used at the discretion or permission of the state and that a person has a right to enjoy something they don't own, right?

A Well, they own the right.

Q They don't own the water.

A No, they don't.
Q The water is owned by the state of Texas. So I think it would be --
A But once they have exercised their right to appropriate that water and take it into their possession out of the stream and take it into their possession, either impound it or use it, the state may no longer take it back.
Q Okay. Drought management plan, the state has authority to restrict the use of a water right, correct?
A Drought management, no. I don't understand how that you get there.
Q Have you looked at the new legislation that's been passed on drought management plans?
A I probably haven't.
Q And my question to you is: There is authority for drought management restrictions that was recently passed by the legislature. And that goes to a usufructuary right.
A I'd have to read the statute. Knowing what I know about the Texas legislature and the Texas Water Code and -- I find it very difficult to believe that a statute says the commission can tell somebody they can't have their water --
Q It doesn't necessarily --
A -- within priority. But I'll -- you know, I could read it but I haven't.
Q Have you read any of the permits of the state of Texas

recently?
A I don't think so.
Q Are you aware that there are restrictions on virtually all permits that are stated in those permits?
A I don't know if I'd say virtually all, but I know that the commission does -- the executive director's office and the commission both insert restrictions and conditions into permits.
Q But you didn't consider that with your testimony today, correct?
A I did. And I'll repeat, the commission has wide authority to include within the permitting process and within the permit restrictions and conditions.
Q But if --
A What it doesn't have the authority to do is when a permit doesn't have restrictions or conditions, it can't create them after the fact.
Q But if I'm correct that there's this drought management concept that has been passed by the legislature and it allows restrictions based on drought conditions -- quote, unquote, whatever that is -- that would be a restrictions on existing permits, right?
A I don't know. I haven't seen the language. And I don't know of a mechanism under which the commission -- is this by order, the commission orders this? I don't want to get into

a -- you're asking the questions, not me. But I'm not familiar with that, and it does not sound logical to me.

Q You read Mr. Soward's report?

A I did.

THE COURT: We're talking about the Texas --

THE WITNESS: And I've read lots of -- I've read --

THE COURT: We're talking about the Texas legislature.

(Laughter)

THE WITNESS: Well, that's true. But I've read lots of drought management plans and I've read lots of water plans and water use plans. And, you know, there's all kinds of that out there, you know. And when you're in the water rights business you do read those. I have never read one that was not consensual where a water right was, I guess, undone, and certainly not by the commission.

BY MR. BLACKBURN:

Q Well, let me go through a couple of thoughts.

A Okay.

Q Cancellation. It's certainly within the authority of the commission to cancel unused rights, correct? It may be hard, it may be difficult, but it's certainly authority that exists.

A It does.

Q How about something like issuing a bed and bank's permit for a return flow from a particular place with a proviso that

that bed and bank's permit transmit all the way to the bay system?

A Well, if it's a bed and bank's permit, I'm assuming they have a destination for the water. So it wouldn't do them any good to have the bed and bank's permit if they can't take the water back out of the stream.

Q Destination is the bay. How about that? Would it work?

A I don't know. I'm not aware that we've ever had an application for that so I haven't really studied it. I mean it sounds like something that could be talked about, certainly.

Q Well, I mean that's the whole purpose here is to try to get creative about these things and try to find out where there's the --

A Well, and one thing about that is it's a permit, so it's a permitting process. Other parties other than the applicant can be involved in a permitting process. You know, they can become parties, as you often represent them, in those cases. And that's something that could probably be considered by the commission in a hearing on a permit application.

Q And I mean one of my thoughts goes to the issue of drought management plan. But since you haven't read the new statute, you really can't comment on that.

A I really can't.

(Pause)

Q How about if I want to sell water that I have to have my

contract approved by TCEQ? Possible?

A That's not the law now but at least --

THE COURT: I'm sorry. Say that again?

THE WITNESS: I'd say it's not the law now or the practice I don't think unless it's changed since I left there. But, you know, I don't -- it's not a constitutional issue like taking private property, for example. I mean it could be done.

BY MR. BLACKBURN:

Q And by the way, under the Constitution you can regulate private property, correct?

A You can.

Q So I mean it's not an absolute restriction on -- you know, you just -- the government doesn't have to just leave total hands off. I mean there is a reasonable allowance of restriction under just general Fifth Amendment takings concepts, right?

A Yes. But all we're talking about is the Water Code. The commission is not a constitutional agency. It doesn't have any authority other than what it has by -- from the legislature.

Q Right. Which would include Chapter 5, correct?

A Uh-huh.

Q Now, what about registration of domestic and livestock users? Right now they're exempt and the testimony in this trial has been we don't know much of anything about them other than they're out there.

A Well, I would disagree with that statement. I think we know a lot about them. And one of the reasons we know a lot about them is that water is scarce in Texas. I mean, you know, time of shortage can be just about any time depending on where you are in the state and what's going on. People who have water rights, people who have domestic and livestock exemptions, pay attention to what's going on with the water along their stream. So it's very unlikely to me that I would -- that anyone at the commission would say we don't really know what they're out there.

Because I did hear in Mr. Soward's testimony he said, well, you know, if you don't have a watermaster you don't really know whether people might be taking water that they're not entitled to. Well, you know, Mr. Soward was in the commission and he didn't have to get the phone calls from the other water rights owners saying get out here and enforce the Water Code because farmer Jones down there is taking my water. People take a great deal of interest in their water, so I would not agree with the concept that we don't know what's going on with D and L users.

THE COURT: I think the concept was that there's really no way to quantify the D and L uses. You make maybe quantify the violations but not the total amount of water that's used. That was what was testified to I think.

MR. BLACKBURN: That was what was testified to, and I

think George Ward yesterday said it was a mystery.

THE COURT: Did I say that wrong?

MR. WILLIS: Well, your Honor, I think if you say -- if you use the term that there's no way to quantify it to an exact amount, then I'd say the Court is correct. I think it was addressed to some degree about the consideration of D and L use in the historic use in the WAM model if you recall some of that testimony. But if you say is there any way the TCEQ can quantify it exactly, the Court is correct on that.

THE WITNESS: That's right.

THE COURT: I just don't know -- I know that the Plaintiffs have talked about this a lot early on and the water people -- with the water people. I don't see that it makes a huge matter in this case though.

MR. WILLIS: That is the ultimate point about the D and L issue.

MR. BLACKBURN: I'm just asking if we could require them to be registered.

THE WITNESS: Uh, I think --

THE COURT: So they could know exactly what the use was.

MR. BLACKBURN: Yeah, exactly.

BY MR. BLACKBURN:

Q I mean that's my question. I'm not even talking about regulating. I'm just saying let's make them sign up and say

how much they're using so we can at least have some number that the TCEQ could tell us with some certainly what's being used. Could we do it?

A I think the legislature could do that. I think that the commission would run into a problem -- of course, that would be litigated -- and I think the commission would run into the problem of the user exempt uses. And "exempt" means you don't have to register or get a permit.

Q Well, they're exempt from permitting.

A Right.

THE COURT: But not registration he's saying.

THE WITNESS: Right. I could argue that, yes. I could argue the other side, too.

THE COURT: Yes.

THE WITNESS: I mean I see that that's something that could be explored. But again -- and I'm not making a -- you know, I'm just saying that as having been at the commission and with all the load of stuff that the commission and the ED's office have to do and the small impact that I think D and L use really does have, I'm not sure that would be -- I mean we could talk about that, but I think ultimately that --

THE COURT: Well, I don't hear anything that makes it a big deal, but I think there's a source of water that we can't quantify. And I think that that's why they keep exploring it in case --

THE WITNESS: Right.

THE COURT: -- somebody is really running a commercial operation and nobody knows it.

THE WITNESS: Right.

THE COURT: I think you're probably right that the watermasters have that pretty well figured out.

THE WITNESS: They do. And really the other water rights owners do --

THE COURT: Because of the other people calling about it.

THE WITNESS: Right. Now in --

THE COURT: The watermaster testified that, you know, at 2:00 o'clock in the morning -- I don't think he gets the call, but he's notified that at 2:00 o'clock in the morning somebody turned a pump on, come out and look.

THE WITNESS: Yes.

THE COURT: And at least the part that you're talking about is under the auspices of a watermaster.

MR. BLACKBURN: That is correct. It is.

THE COURT: Not the rest of Texas necessarily but this particular water river system --

MR. BLACKBURN: Right.

THE COURT: -- two river systems are. And it seems to be a helpful thing.

THE WITNESS: I worked really closely with both

watermasters while I was at the agency. It was another one of my specific areas that I concentrated on. And I was very impressed by their operation. They do keep track of, not every drop of water, but boy they're close.

THE COURT: They seem to be quite on the spot if there was a problem.

THE WITNESS: Yes.

BY MR. BLACKBURN:

Q And sort of along those lines, did you look at the authority that the watermaster has?

A Yes, I have many times.

Q Right. And would you agree that the watermaster has more authority than the watermasters have historically used?

A In what way?

Q I mean under the --

A My belief is that the watermaster does not have authority to curtail senior water rights for anything other than more senior water rights or D and L or other exempt use.

THE COURT: But he told me I think, if I remember the testimony, about the watermaster, is that if somebody is permitted 10,000 acres, when they start to use it 1,000 acres at a time or whatever, they write to the watermaster --

THE WITNESS: Yes.

THE COURT: -- and say: I'm about to take out a thousand acres. And the watermaster has the authority to say:

No, you aren't using that. You're supposed to tell me what the use is. This is not the use we permitted, so you can't do that --

THE WITNESS: Right. That's what the watermaster does.

THE COURT: -- and you can't sell it --

THE WITNESS: He enforces the permit.

THE COURT: -- and you can't do this and it has to go to a beneficial use, whatever that means.

MR. BLACKBURN: Right. But --

THE COURT: So is that what you're talking about?

MR. BLACKBURN: That's what I'm talking about, your Honor, is that I think the way that language is worded -- and I'm not going to sit here and make a legal argument, you know, all the way right now. We'll --

THE COURT: Of course you are.

MR. BLACKBURN: We're going to brief it.

BY MR. BLACKBURN:

Q But I just wondered if you'd look at it and considered how much perhaps reserve authority there is under the watermaster if you were trying to get creative.

A I think you can be creative but not outside of the law. The watermaster cannot curtail to the point of depriving a senior water right when they call for it. If it is compliant with the permit, if there is no downstream senior or D and L

that's being impaired -- and there are a couple of other conditions but similar -- I think the watermaster does not have the discretion to say, well no, I'm not going to let you take your water.

THE COURT: I didn't understand that to be the case either. But on the other hand, I think maybe what he's intimating is that -- I didn't see that to be the case either on testimony, but he's intimating that the watermasters are not exercising that complete authority.

BY MR. BLACKBURN:

Q And I was just curious if you'd looked at it as part of the work you did.

A Well, I was involved when the watermaster, both as executive director and as lawyer for the executive director, I was involved when a watermaster would make such a decision usually. I mean they seek legal advice as well. And we would contemplate, you know, especially if we had a -- if there is any kind of question as to whether it was a legitimate call to say, no, you can't have this water, we would consult on that.

Q Well, I'm sorry. I think you misunderstood my question. I meant did you look at it --

THE COURT: I may have misunderstood.

MR. BLACKBURN: Well, no, no.

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BY MR. BLACKBURN:

Q What I was asking is did you look at that specific issue prior to coming in and testifying today, not that you had ever -- not that you had worked on it in the past.

But today prior to coming in did you look specifically at the watermaster authority and consider how that could be possibly used?

A Yes.

THE COURT: Are there waters outside of -- what are sources of water for people that just want to buy water?

THE WITNESS: Well, of course, there's a water right. And then you buy water from people who have water rights. You can do that. Of course, there's ground water. There's --

THE COURT: And that belongs to Texas, too.

THE WITNESS: Yes.

THE COURT: If you drill a well, you still need a permit for the well.

THE WITNESS: Not necessarily. We have the rule of capture in Texas, which I do believe is a mystery. But to try to put it in a simple way, the water while it's in the ground belongs to the state. But we have the rule of capture which means --

THE COURT: Oh, that's right. When it comes out it's yours.

THE WITNESS: Right. Then when you get it you've

captured it.

THE COURT: It's a mystery.

BY MR. BLACKBURN:

Q And that's actually probably -- I'm not sure if the Texas Supreme Court has recently ruled on that or not, but I think even that is up before the Supreme Court.

A Yes, it has been. There was a case about these guys, Ozarka, and I don't know how they came out. They were draining all the water out of Texas.

MS. UNIDENTIFIED: I don't follow --

THE COURT: Who was? Oh, well, there you go.

BY MR. BLACKBURN:

Q I guess really my final question, there's sort of something to me that I find interesting; and that is, some of the water permit holders are governmental entities and --

A Or quasi.

Q Or quasi governmental or sub -- you know, but certainly subdivisions of many are subdivisions of the state of Texas.

And do they enjoy the same usufructuary right as do non-governmental entities?

A As far as I know, yes. And no one has ever tried to parse who has the water right and say that it's a different -- has a different quality because it belongs to -- you know, the water right is issued to a corporation versus an individual versus a governmental entity.

Because it's the use of the water that's the issue for the commission. Is it going to be a beneficial use and -- and beneficial use doesn't just mean, you know, it's a good thing; it's going to be water for building a highway or water for agriculture or whatever. "Beneficial use" means economic conservatory -- beneficial means you're going to use the water beneficially to be as conservative with it as possible, in addition to it's a use that the legislature approves of.

THE COURT: Well, when they applied for a water permit for this bay and estuaries to preserve it, it was turned down. Did you know that?

THE WITNESS: No.

MR. BLACKBURN: Let me just ask one last --

THE COURT: Ask about that.

MR. BLACKBURN: Well.

THE COURT: That wasn't under her watch was it?

MR. BLACKBURN: No, I don't think it was under Ms. Hoffman's watch.

THE WITNESS: I hope I wouldn't have forgotten something that major.

BY MR. BLACKBURN:

Q You don't know anything about the San Marcos River Foundation's application for setting aside water for San Antonio Bay or was that on your watch?

THE COURT: Under the beneficial use.

THE WITNESS: Well, when the -- actually when the -- it was Jeff Saitas and then me. I did become executive director while that was still pending.

BY MR. BLACKBURN:

Q Oh, you did. So you know something about it.

A Well, I know that the executive director -- actually, Todd will have to correct me if I'm wrong on the fact, but I know that the executive director staff was in the process of drafting a permit.

Q They had started processing and were working their way through when --

A Right.

Q -- the commission stopped it, right?

A In response to -- you know, once again, not sua sponte but in response to a motion, you know, in a procedure.

Q Right. And one would say perhaps in response to politics.

THE COURT: Don't make her say that.

MR. BLACKBURN: I know. I know.

(Laughter)

BY MR. BLACKBURN:

Q And I guess final question, property rights. Does the state have to compensate a subdivision of the state for a -- how would you put it -- elbowing in on a usufructuary right?

A I haven't got a clue.

Q Haven't got a clue.

MR. BLACKBURN: Thank you, your Honor. I have no further questions.

THE COURT: Thank you. Mr. Coover?

MR. COOVER: Just one question, your Honor, or two.

REDIRECT EXAMINATION

BY MR. COOVER:

Q We made it clear you listened to Mr. Soward's testimony, Ms. Hoffman?

A Yes, I did.

Q Then you heard him agree with Mr. Willis' characterization of an adjudicated water right as a vested protected property right?

A Yes.

MR. COOVER: That's all. Thank you, Judge.

THE COURT: Thank you. Thank you, ma'am. Good to see you.

THE WITNESS: Good to see you.

(Witness steps down)

MR. WILLIS: Your Honor, at this time the Defense rests.

(Defense rests)

THE COURT: No.

MR. WILLIS: Yes.

THE COURT: Do you have more witnesses, the Plaintiff?

MR. BLACKBURN: Your Honor, we had represented to the Court that we would call Dr. Felipe Chavez-Ramirez to come back and talk about the crane that was found -- the carcass that was found on the refuge. And he is not here right now. And we have an alternative concept.

We are proposing to introduce a press release that was entered -- or I say press release -- it's a official announcement by the Fish and Wildlife Service that recounts essentially the current status at the refuge and includes information about the carcass. We have marked it as Plaintiff's Exhibit 392 and would offer that. And in exchange it would not be necessary for us to call Dr. Chavez-Ramirez back to the stand and, frankly, we could all go home. And I don't know if there's objection to it or not.

MR. WILLIS: There are numerous objections, your Honor. Although I like the bait and switch on getting a chance to go home, still I'd like to make the objections to it.

First of all, it was first referred to as a press release. There is a -- it's on certainly what appears to be -- it's entitled United States Department of Interior. It's not signed by anyone, so first of all we'll object to it on rebuttal evidence at this point as there's no justification for it. It does, in fact, speak to the issue that you heard about the other day regarding a crane. It speaks to several other issues that are outside any evidence that has been brought

forth in this case.

THE COURT: This is the bad things. I have to look at it to interpret your objection and then I've got it.

MR. WILLIS: I understand. But at least for the record --

THE COURT: You have preserved your objection. Keep going.

MR. WILLIS: Thank you. So one is on the issue of rebuttal evidence. And I'd cite -- for the record I'd cite a Fifth Circuit case, *McVey versus Phillips Petroleum Company* at 288 F.2d 53. That was Fifth Circuit 1961.

And further, your Honor, I'd indicate I would object to it based on authenticity under Rule 901. Further, that there's no exceptions for self-authentication for this document.

And finally, your Honor, the document is -- contains numerous examples of hearsay under 801 and there are no exceptions to the -- under the hearsay exceptions rule that would allow the evidence to be in.

That's all I've got.

MR. MUNDY: Mr. Blackburn called for reinforcement, so if I might, your Honor. It's self-authenticating under 902(1). It is a document under seal at the U.S. Fish and Wildlife Service and the Department of Interior, so it meets 902 subpart 1, and we would offer it under the residual hearsay

exception under Rule 807. It was released from yesterday and it's -- we've seen other of these through the course of the trial and heard them described, but it is under three elements under A, Part A of 807.

It is offered for evidence of material fact. It's (b) more probative on the point for which it's offered than any other evidence of which we can procure through reasonable efforts. And Mr. -- or Dr. Chavez has gone back to Lake Jackson and cannot be back here until tomorrow afternoon at the earliest possible time. And no knock on them, but they went a little faster than we had all anticipated.

THE COURT: Well, you can just come back tomorrow afternoon.

(Pause / Counsel confer off the record)

MR. WILLIS: You know what, Judge. We're going to stand on the objection to the document. I understand what the Court's position is. But, you know, frankly, this could have been brought up beforehand and --

MR. MUNDY: This just came up yesterday. This was issued yesterday. It's dated December 14th; today is the 15th.

MR. WILLIS: Your Honor, without --

THE COURT: I don't want to pressure you about this. We'll just come back tomorrow afternoon. It's no problem. You don't all need to be here. You can designate somebody. You can designate Mr. Coover and Ms. Snapka from various sides and

give her the authority from the San Antonio River Authority. Let one of the Plaintiff's lawyers come back tomorrow for one witness.

MR. WILLIS: Or we could -- you raised a good point, your Honor, for you -- before that earlier when you said it's going to be difficult for you to rule on some of the issues without looking at the document itself.

THE COURT: No, I'm not ruling on anything in the near future.

MR. WILLIS: No, I just meant on this objection.

THE COURT: Oh.

MR. WILLIS: I'm sorry. But and this is -- it would appear to one -- I'll build a straw man here if I might. It would appear to one that if Mr. Blackburn did not author this document, he certainly could have. It's something that -- I'm not saying that. What I'm saying is it helps -- it is kind of an outline of the Plaintiff's case --

THE COURT: Is it well written? Is it well written anyway?

MR. WILLIS: I at least give him -- no, I'll give the indication it's well written. But what it is, is not only does it repeat a lot of the same allegations in Plaintiff's case, it also adds a few new things that I don't know that even Mr. Blackburn would say would be relevant to this.

THE COURT: No, I'm just not going to read it. Why

don't you just -- we'll just come back tomorrow afternoon and hear from Dr. Chavez-Ramirez.

MR. MUNDY: Could I make an inquiry of the Defendants? Would it be something -- he's only on this narrow point. Would they entertain the idea of trying to reach him on the phone right now, see if I can track him down --

THE COURT: Sure.

MR. MUNDY: -- we call him like you would on a phone depo?

THE COURT: How about that?

MR. WILLIS: That's fine. And if you can track him down by phone -- now, if it's a cross -- we can certainly check on that. If it turns out to be a cross examination issue we're still going to --

THE COURT: Do you want to do him in person? That's fine.

MR. WILLIS: Well, and we still will have an objection to him not just to prove up the document but any testimony as a rebuttal witness --

THE COURT: I don't think he's going to prove up the document --

MR. UNIDENTIFIED: No.

THE COURT: I think he's going to testify to whatever it is they want in in the document.

MR. BLACKBURN: Correct. Give me a second, your

Honor.

(Pause / Voices heard off the record)

MR. WILLIS: We might have agreement. We'll see.

MR. BLACKBURN: Okay. We have a resolution.

MR. UNIDENTIFIED: Go ahead.

MR. BLACKBURN: I think we would like to jointly stipulate that one crane has been -- that one crane carcass has been found this year.

THE COURT: I read it in the newspaper.

MR. BLACKBURN: I know you did.

(Laughter)

MR. WILLIS: We further stipulate that you have read that in the newspaper.

MR. BLACKBURN: And that it is a fact in evidence in this trial.

THE COURT: Okay.

MR. WILLIS: Well, Defendants agree.

THE COURT: All right. That's fine.

MR. WILLIS: And so based on that we'll withdraw --

MR. BLACKBURN: I'll withdraw.

THE COURT: So should we talk about when we want to meet again and we can do this by phone when you want to go into the other aspect of this? Would it be more helpful for you for me to be more prepared and have read all the exhibits and looked at the hours of -- what are there, 90 hours of video?

MR. WILLIS: That's a question that I would defer to -- no, I'm just teasing your Honor. Well, my thoughts would be --

THE COURT: Maybe I can just say you have to come back while I watch all the video.

MR. BLACKBURN: We have to watch it with you?

THE COURT: Yes. And you bring the popcorn.

MR. WILLIS: My thoughts would be that based on what the Court has said that assuming the Court was going forward the way you've already said you would, you were going to go back over things --

THE COURT: Oh, yes.

MR. WILLIS: -- in the meantime, if you would let -- at least from the state Defendants' and the Plaintiff's standpoint -- and I would imagine the Intervenors would agree -- let us decompress, let us digest this for a little bit. We will be in touch based on the other potential avenues that we discussed with the Court previously. And within I would say certainly two weeks we would at least try to notify the Court of kind of what our thought process is in that regard. Does that sound --

THE COURT: And if you would just have -- just designate lead counsel from every side so we don't have to have everybody on the phone all the time, you can; it's no problem. I've had telephone -- Ms. Snapka knows -- telephone conference

calls with 50 attorneys on the line or more. So it's no problem. But I'm just saying if you want to pare it down to the minimum about how you want to proceed in another phase and how much time you think you want to brief and go over all this again by way of closing arguments, or if you might want to put that off as well.

Clearly, if I rule for the Plaintiffs, eventually it's not going to help this year anyway. So I don't think we're on a huge -- you know, a huge time crunch at this point.

MR. BLACKBURN: I mean I would agree with you --

THE COURT: We're almost through the winter season.

MR. UNIDENTIFIED: Right.

MR. BLACKBURN: I would agree with you that from that standpoint --

THE COURT: And I'm not saying I would rule that, but I'm just saying I don't see time as an urgent -- as urgent at this time.

MR. WILLIS: Well, certainly from a briefing standpoint, obviously since it's almost the holidays, we would have to have the record. I mean we're obviously talking about quite some time for the briefing issue.

THE COURT: I agree with you.

MR. WILLIS: Okay.

THE COURT: I mean I consider me working on this all summer actually.

MR. BLACKBURN: So would it be possible then for us to get back with you after the first of the year with a proposed --

THE COURT: Let's do that. Let's get through the holidays. You all go visit your families and do a telephone conference call with me after the holidays and we'll talk about what you come up with as a schedule.

MR. UNIDENTIFIED: That sounds good.

MR. BLACKBURN: Sounds excellent, your Honor.

THE COURT: Sounds good.

MR. WILLIS: Thank you so much for your patience.

THE COURT: Thank you very much. I just -- it's so good to see such brilliant lawyers, really. All of you and --

MR. UNIDENTIFIED: Including Mr. Coover?

THE COURT: -- presenting things so well. Not all the witnesses were what you expected. Some of them were better than expected. All of them were smart and I learned so much from all of you. And I want to thank you very much for your presentation, the quality of your presentation, and for being able to read me, too. That was helpful for all of us. So thank you all. We'll be excused until we meet by telephone.

(Counsel thank the Court)

THE MARSHAL: All rise.

(This proceeding was adjourned at 5:16 p.m.)

CERTIFICATION

I certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

January 27, 2012

Signed **Dated**

TONI HUDSON, TRANSCRIBER