UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF CALIFORNIA

HON. OLIVER W. WANGER, JUDGE

THE DELTA SMELT CASES, SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, et al., Plaintiff, vs. KENNETH LEE SALAZAR, et al., Defendant. AND CONSOLIDATED CASES.	No. 09-CV-407-OWW PRELIMINARY INJUNCTION HEARING DAY 1

Fresno, California Tuesday, July 26, 2011

REPORTER'S TRANSCRIPT OF PROCEEDINGS

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Official Court Reporter

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INDEX

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EXHIBITS

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Tuesday, July 26, 2011 Fresno, California
8:35 a.m.

THE CLERK: Court calls item number 2. 09-CV-407. The delta smelt consolidated cases. Evidentiary hearing.

THE COURT: Will the parties please enter their appearances.

MR. GONZALEZ: Good morning, Your Honor, Arturo Gonzalez, Chris Carr, William Sloan for Morrison & Foerster on behalf of the Metropolitan Water District of Southern California.

MR. SIMS: Your Honor, Steve Sims with Westlands Water District. I apologize for appearing without a jacket in your courtroom. I left it at the airport.

MR. WILKINSON: Good morning, Your Honor, fortunately I did not have a wardrobe malfunction this morning. Greg Wilkinson for the State Water Contractors.

MR. LEE: Good morning, Your Honor, Clifford Lee with the California Attorney General's Office here on behalf of plaintiff intervenor California Department of Water Resources.

MR. WEILAND: Good morning, Your Honor, Paul Weiland and with me is Ashley Remillard on behalf of the plaintiffs Coalition for a Sustainable Delta and Kern County Water District.

MR. ANDERSON: Good morning, Your Honor, Steven Anderson also on behalf of the State Water Contractors.

MR. O'HANLON: Good morning, Your Honor, Daniel O'Hanlon appearing on behalf of the San Luis and Delta-Mendota Water Authority and the Westlands Water District. With me this morning is my associate Hanspeter Walter.

MR. MIDDLETON: Good morning, Your Honor, Brandon Middleton for Stuart Jasper Orchards, Arroyo Farms and King Pistachio Grove.

MS. DIEPENBROCK: Good morning, Your Honor, Eileen Diepenbrock for Westlands Water District and the San Luis and Delta-Mendota Water Authority.

MR. MARTIN: Good morning, Your Honor, Steve Martin for State Water Contractors.

MR. EDDY: Good morning, Your Honor, Ethan Eddy for the federal defendants with here today with Jim Monroe and Kaylee Allen for the Department of Interior, Office of the Solicitor.

MR. WILLIAMS: Good morning, Your Honor, Robert Williams on behalf of the federal defendants.

MS. STIMMEL: Good morning, Your Honor, Anna Stimmel on behalf of the federal defendants.

MR. TORGUN: Good morning, Your Honor, George Torgun on behalf of the defendant intervenors Natural Resources Defense Council and the Bay Institute.

MR. ORR: Good morning, Your Honor, Trent Orr also on behalf of defendant intervenors.

MS. POOLE: Good morning, Your Honor, Kate Poole on behalf of defendant intervenor Natural Resources Defense Council.

MR. OBEGI: Good morning, Your Honor, Doug Obegi on behalf of defendant intervenor Natural Resources Defense Council.

THE COURT: All right. This is the time we have set for hearing the plaintiffs' motions for injunctive relief respecting one of the reasonable and prudent alternatives, which is number three.

And the starting point for the hearing, as I understand it, was the parties' request that the Court rule on objections that have been made under substantive law and the Federal Rules of Evidence to proffered proposed evidence that the parties who are plaintiffs are seeking to submit.

And so we will start with that, unless somebody has something that they wish to present preliminary to that. So if any party has anything that they wish to present, you may do that now before we start with the rulings on the evidentiary objections.

Nobody indicates that they have anything they wish to present. And so let us turn to the issues that have been raised by the defendants. And for the purposes of this ruling, I'm referring to the federal defendants and I'm referring to the defendant intervenors.

The objections that have been raised include that in the context of the procedural posture of the case, that a judgment has been entered, both on the NEPA claims and on the ESA claims and that, in a post-judgment status, the defendants assert that the Court is limited to first the doctrine of law of the case which would preclude re-litigating substantive issues that have been decided by the Court.

That to the extent that evidence would bear on an issue decided or if the evidence bears on the subject matter of issues that have been decided, that the plaintiffs were required to present any evidence applicable at the time the cross motions for summary judgment was heard preliminary to the entry of decisions and judgment in the case. And that, in effect, there is an implied waiver that would prevent the introduction of such evidence in this proceeding.

The objection is raised that insofar as the plaintiffs offer evidence of irreparable harm that is economic in nature, that *TVA versus Hill* and the jurisprudence that underlies the ESA prevents consideration of such evidence.

And specifically Mr. Erlewine's declaration is objected to as including speculative opinions, opinions for which he is not qualified to express and on subjects that are beyond his personal knowledge.

There is also an objection to Dr. Sunding's declaration on the basis that it is responsive to a

declaration in another case and that it isn't material and relevant to the issues that are raised.

Mr. Mettler and Mr. Stiefvater, S-T-I-E-F-V-A-T-E-R, declarations are purely economic.

The Court, in addressing these objections, will start with what is believed to be the applicable decisional standard that applies in the context of where the lawsuit is, not only from a procedural standpoint, but from the standpoint of the relief that is being sought.

The Court has read and refers first to the context in which the objections are raised. This is a post judgment injunctive proceeding. It is not a proceeding that reviews administrative agency action that is before the Court for analysis or decision.

This subject is most recently addressed in *Sierra Forest Legacy versus Sherman*, 2011 Westlaw 2041149. It is a 2011 decision of the Court of Appeals for this judicial circuit, which is the Ninth. And it was filed May the 26th of 2011.

In that case, a NEPA violation that concerned the Forest Plan was at issue. And it is almost all on fours procedurally in context with this case. The district judge there, happens to be Judge England in Sacramento, was faced with the question of whether or not injunctive relief pending the remand for the preparation of an EIS by the Forest Service

could be entered. And he used the APA deferential standard to administrative agency analysis and application.

The Ninth Circuit said that was wrong. That in the context of injunctive proceedings that are post judgment, there had been two findings. In some respects the Forest Plan had not violated NEPA, in other respects it had.

And in that case, drawing from *Winter versus Natural Resources Defense Council*, where, as you all know, the Navy was engaged in sonar testing procedures off the Pacific Coast. And those procedures were allegedly interdicting and upsetting whales. And that was viewed in terms of the agency's competence and expertise.

And the way the Court analyzed it, there were two fields of expertise. One, the Ninth Circuit found to be unique and inherent, integral to the agency's operation. And that was national security, national defense, functioning of the military. And the other was ecological, and that was what's the effect of sonar on the whales.

The Court said on the latter that there was no deference to be given because that was not the agency's inherent and unique and special expertise for the purposes of the post-judgment injunction proceeding.

And the Court further said that, in essence, if as here, the defendants argue that first if you have an ESA case, in effect, there's never a case in which an injunction could

be issued because you've always got to defer to the agency and as long as the agency says this is right, that's the end of the inquiry. Can that be the law?

Second, as in that case, the Ninth Circuit essentially said that the context in which -- and I will now compare it to the context of this case. In this case, the Court has found NEPA was violated. And that the agency has to prepare the appropriate environmental assessment. And the Court believes the environmental impact statement will be required considering all the aspects that that law requires to be vetted, analyzed and considered, including, in that case, the economic impacts.

And in this case, the ESA has also been found to been violated, and something that, for some reason the defendants do not mention in their papers, the BiOp has been found to be unlawful and RPA 3 has been found to be unlawful.

And so the starting point is, the Court believes, we have unlawful agency action. We have an unlawful BiOp. We have illegal -- an illegal RPA. And so, in terms of -- and an RPA that appears to be the subject of increasing controversy and increasing challenge and increasing doubt about its efficacy.

And what we are approaching is the question of whether the measure should be implemented. There's no question it's unprecedented. There's no question that this

kind of a commitment of CVP water has never been appropriated for such a use in the history of the operations of the project.

And so this proceeding is to determine whether or not and to what extent the application of RPA 3 in this water year, starting in approximately September and running into and through the fall months to the early winter, should be implemented by the combination of the NMFS and the Bureau of Reclamation, who's the action agency that operates the projects.

And the Court believes that information that is very necessary in addressing the injunction standards -- and I don't want to get ahead of myself here. But the traditional standard applies. All four factors of the injunction test that are exposited by *Winter* and the Ninth Circuit cited specifically to an additional injunctive relief case that the Supreme Court, within the last four years, has examined.

The question remains that in the application of these evidentiary standards, what is the Court to consider?

And the Court considers, first, the nature of the extent of the harm in terms of irreparability that may be visited by the action that is proposed to be taken.

The Court examines the legal justification in terms of the likely success on the merits. The Court balances the hardships.

And finally, the Court is bound to consider the public interest in determining what effect the proposed action -- and here, so that there is no ambiguity, the plaintiffs seek to enjoin the application and the implementation of RPA 3 in -- it's actually a combined water year, it is the 2010/2011 water year and it also will implicate the 2011/2012 water year because the water year ends September the 30th. And for this year, that will be in 2011.

And so, recognizing that this is perhaps not entirely new law, but it certainly is elucidating law that makes very clear where we are in this proceeding, the Court is of the belief that the scientific evidence must be heard.

That isn't going to revisit, that isn't going to re-decide. The RPA is unlawful. The BiOp is unlawful. That has been decided. That's on appeal. But there is nothing about determining whether the RPA, which has never been implemented, should or should not be in place and permitted to operate.

And so this hearing is going to examine what are the current conditions and -- as the Court in its jurisdictional ruling has indicated, and if there were any question about it, certainly *Sierra Forest Legacy* should put that to rest.

But after the Court has entered a judgment in aid of its jurisdiction, even if the jurisdiction has been, in effect, transferred to the Court of Appeal, the ongoing, on

the ground operations of the projects are not immunized, they are not removed from judicial scrutiny.

And as was the case in here, the Ninth Circuit didn't decide what the terms and conditions of the injunction in *Sierra Forest Legacy* was or should be in the context of a post-judgment injunction. It sent it back to the trial court for that determination.

The Court believes that the declarations that are submitted by Mr. Erlewine and the farmers do raise issues. It is preferred that if there's a lack of foundation, if there's a lack of qualification or if there is speculative opinion, we'll take that on a question by question basis. The objection can be raised, I'll rule on the objection as it is made.

The Court does believe that the issue of economic harm and the consequences of the relief -- we have both a NEPA ruling and we have an ESA ruling. And to the extent that the defendant's interpretation of the ESA that economic evidence is never admissible and never relevant in the context of an ESA case.

The Court believes that -- under the NEPA ruling, that such evidence does have relevance and the Court will, for the purposes of the record, receive that evidence if there's time.

And the Court will prefer that -- I recognize that

you have your witnesses scheduled in the order you want them. But I want to hear water supply, operational projections, I want to know what you actually believe is going to be required, recognizing that we have day-to-day changes in hydrology and climatic conditions and in operational constraints under the Coordinated Operating Agreement that the Bureau and the Department of Water Resources operate under.

But we have estimates that go all the way in the 400,000 acre feet up to a million acre feet. I want to have some better idea of what is really involved beyond that.

And so in terms of the exclusionary objections that are being made, for all the reasons I've stated, I'm overruling those objections. But I am still going to hear -- and I expect the defendant intervenors and the federal defendants to make their objections during the proceeding and I will rule on those objections as they are made if there are specific questions that either are improper under the rules of evidence or if there's a lack of foundation or basis for an answer premised on the subject matter.

I could say a lot more. It's now nine o'clock. I don't know how much time was allocated for this. But my sense is it's better that we get into the hearing rather than my talking anymore, unless any of the parties want to either say anything or unless you want to raise any questions at this time about where we're headed.

MR. EDDY: Your Honor, I do have a minor point, which is that you indicated that you would take objections to testimony given by Mr. Erlewine and the two farmer gentlemen.

THE COURT: That's not all. I've said I'll take evidentiary objections throughout the hearing. In other words, the rules of evidence are not being abated.

MR. EDDY: And specifically --

THE COURT: The federal rules.

MR. EDDY: I'm sorry, Your Honor. Specifically with respect to the two farmer witnesses.

THE COURT: Yes.

MR. EDDY: The parties have stipulated that those witnesses would testify on the papers. So --

THE COURT: By declaration, I think that's wise.

MR. EDDY: So we won't have an opportunity to raise that sort of question-by-question objection here. But we'll just note a standing objection to that as Your Honor considers those materials when the matter is under submission.

THE COURT: Thank you. And if there is something that is particularly -- in your judgment, or in the defendant intervenors' judgment, particularly inadmissible besides the objections that I've already ruled on, the substantive law objections, then you can raise those before the hearing is over.

MR. EDDY: Thank you, Your Honor.

THE COURT: All right. Anything further before we get started?

All right. Then let us proceed.

MR. GONZALEZ: Good morning, Your Honor, Arturo Gonzalez here to deliver a relatively brief opening statement. And we have just a few PowerPoint slides that hopefully are on Your Honor's screen if this is working properly.

THE COURT: They are.

MR. GONZALEZ: So, Your Honor, there are two issues that we're going to address through our witnesses. And the two issues are if we, for the first time, divert hundreds of thousands -- and I don't think we need to get into a debate at this point as to whether it's 600 or 900. We know it's hundreds of thousands of acre feet of water.

If we are to lose that water, what will the harm be? And why are we doing it?

The government has argued that it is something that is necessary to do in order to protect the delta smelt. I think that's the key issue here. If we, the plaintiffs, can demonstrate that there's no factual evidence, that there's no reliable scientific evidence that you even need to do this, or that diverting all of this water which you're going to lose forever is going to help the delta smelt at all, then why are we doing it?

We're going to start there with our witnesses, Your

Honor. We're going to bring witnesses that are going to explain to the Court that there is no reliable scientific evidence at all that an injunction will harm the delta smelt. Again, we think that's the key.

Then we're going to bring witnesses to talk about what will the harm be to the people if you divert that kind of water.

And I want to start, Your Honor, with what the Court said in its ruling on December 14th, 2010. The Court noted that it was undisputed that the application of a quantitative life cycle model is the preferred scientific methodology. And that the failure to prepare one was inexplicable.

One would expect, after that ruling came down some seven months ago, that the government would have prepared one. But the Court said that the government had the time and ability to prepare one and that they would come here because they knew this was going to occur, they knew that at some point we were going to have this hearing if there was going to be a wet year. And they'd put someone in the chair. And that person would explain to the Court what they've done and would explain to the Court that we need this X2 business because otherwise it's going to harm the fish and here's our evidence of that.

You won't hear that. You will not hear that from any government witness because they still haven't done what you

said many months ago was inexplicable for them not to have done. They still haven't done it.

So not only do you not have any additional reliable scientific evidence to address the issues that Your Honor noted in the order were of concern. For example, Your Honor said, "Well, even if I accept the notion that X2 is a relevant criteria, where are you drawing the line? Where do you get this number 72 kilometers? Looks like someone just pulled that out of a hat. Explain that one to me."

They don't have anyone to explain that one either. They don't have a witness who's going to come in and say, "Well, Your Honor, you asked a pretty good question, how did we pick this number. We actually have a new number now and here's the new number. And let us explain to you how we got there." Nobody's going to come in here and say that.

So the deficiencies that Your Honor noted many months ago are still there. But it actually, Your Honor, is even worse. And here's why.

What did the BiOp rely on in the first place? In order to find that we need this X2 and we need this 72 kilometer line to be drawn, we've got to have this X2 business in the fall or we're going to hurt the fish. What did they rely on for that? I think it's very important to take a step back just briefly. And what the BiOp says -- and I have it on the screen, Your Honor, at page 236 -- the BiOp by the way is

Exhibit 1 to this proceeding.

It talked about an article that had been drafted by Mr. Feyrer in 2008. It was a draft article. And there's nothing wrong with relying on a draft article that's awaiting publication.

That's not our point. Our point is that the Feyrer draft article, the language that the government relied upon in the BiOp and the language that presumably Your Honor relied upon in ruling in the government's favor on a couple of points on X2, I'm going to demonstrate to Your Honor that that language is now gone. Mr. Feyrer has published that 2008 article. And the words in that article that the government relied upon for this X2 business that got us here in the first place are gone.

The next slide, Your Honor, cites to two parts of Mr. Feyrer's 2008 article. This is Exhibit 7 to this proceeding. And I want to flag just a couple of parts of it in the interest of time.

First, Mr. Feyrer's 2008 draft article had said that the amount of habitat has affected delta smelt abundance. And he had a table, Table 1, that was the source of that statement. Then he said, "Manipulations of autumn X2 could result in substantially different population levels." "Could result." He didn't say it would. He said it could.

Here's the key. Both of those statements. This is

the heart of where the government got its information in the BiOp for the X2 business at all. Both of those assertions that I've got on the screen are gone. They are not included in the final published article.

And I'm going to show you, Your Honor, just briefly, Table 1 from the draft 2008 article. You see right in the middle there it's got X2. And this is the table on which Mr. Feyrer relied for the statement I previously showed and the government relied on in the BiOp. This table is gone. It is not in the final publication.

The next page is Figure 3. Figure 3, Your Honor, is what Mr. Feyrer relied upon for the second statement that I displayed moments earlier, where he said that autumn X2 could result in substantially different population levels. I emphasize first that he didn't say it would, he just said it could.

The key is that this figure that you're looking at, Figure 3, which is the basis for that statement. For the record, he says on the bottom, "X2 management scenarios." And he looked at different scenarios on the X2. And based on what he looked at, he said, yeah, it could have an impact.

This Figure 3 is gone. It is not in the final article that was published just this year by Mr. Feyrer.

THE COURT: And what has it been replaced by?

MR. GONZALEZ: Your Honor, it's the same article

without all of this information. It has even fewer teeth than it had in the first place. We came here before --

THE COURT: The answer to my question is nothing?

MR. GONZALEZ: Correct, Your Honor. They're just gone. There is no explanation as to why they're gone. They're just gone. And in his declaration what he says is, well, that's true, they're gone. But that's because I'm working on yet another article and I plan to include that in this other article that I will publish someday.

So first of all, Your Honor, we have a BiOp that the Court has already found to be invalid. We have the BiOp relying on an article that we argued before was very weak in its foundation. And now that foundation has just crumbled.

So our second point. Even if one were to assume that X2 was a valid criteria to consider, where are you going to draw the line? Well, this Court already said in its order December 14, 2010, that the BiOp fails to explain why maintaining X2 at 74 is essential to avoid jeopardy. That language, Your Honor, is on the monitor to refresh the Court's recollection.

There still is no explanation. Many months later we still have no explanation of why the line should be drawn there. If you assume X2 is relevant to this issue at all. Our experts will testify, Your Honor, that they have done more work since they were last here as to what is it that harms the

delta smelt, what is it that matters. And does this X2 business matter?

And they look at it for this purpose only. They look at it to answer the Court's question, if I issue an injunction, is it going to harm this species? And the answer is no. We've done a lot of work, we've looked at a lot of things and there are other things that matter to the survival of the species, including food, predators, water temperature. But X2 is not one of them.

THE COURT: And why is that? We know that salinity has adverse effects and that the purpose of trying to reduce or control salinity, in terms of its adverse effect on the species, is not argued among scientists.

MR. GONZALEZ: Your Honor, I'll put that question to the experts and have them explain it. What I can tell you is this: The experts, the way they do their work, if they do it properly, they look at the data that is available. And looking at the data that is available, no scientist has found in any reasonable publication that X2 is a factor in what -- that affects the species.

And there are a number of reports, I'm going to cover some of them just briefly. So it's not just our experts, it's other experts in this area, in this field who have published articles recently that examine the precise issue that this Court is being asked. What is it that causes the species to

suffer? And it's not X2.

Your Honor, we're going to bring two experts -- as soon as I sit down, the government can say a few words if they like, and then we're going to put Dr. Deriso back on the stand. And he's going to testify, along with Dr. Maunder, that they found no statistically significant effect of X2 on smelt survival. That what they found, looking at all of the available data, which is what they focus on, not politics, not love of animals, they look at the data. And the data points to food supply, predation, temperature and density dependence. That is what the data points to. And it's not just them, Your Honor. Just very briefly, I have just a few more slides.

Dr. Kimmerer. This I believe is Exhibit 11, Plaintiffs' Exhibit 11 to this proceeding. Dr. Kimmerer reached the same conclusion. He also looked at the issue of the delta smelt and what is it that appears to help or harm the species. And he said that the abundance of delta smelt cannot vary with X2. And it wasn't just him.

Then we have Thomson and MacNally, two separate publications, Your Honor. Very interesting articles. They looked, Your Honor, at four different species. And they were examining what may have caused the decline of those four species, one of which was the delta smelt. And they have a good explanation and discussion of what factors they believe, based on the data, contribute to the decline.

What's interesting is what is not there. Neither one of them point to X2 as being a factor. An important footnote, Mr. Feyrer, which the government relies upon in the BiOp, is the co-author of both of those publications, as is Mr. Newman, who has also testified for the government, as the Court knows, in these proceedings.

So we have Dr. Deriso, who has done additional work since he was last in this courtroom testifying. And he will tell you that he didn't find any connection with X2. You have both Mr. Thomson and Mr. MacNally publishing articles that are consistent with that. And you have Dr. Kimmerer.

Now, briefly, Your Honor, I want to introduce the Court just briefly to Dr. Burnham. Dr. Burnham has not testified yet in this courtroom. He has 40 years of experience with government wildlife agencies. I think it will be undisputed that he's one of the world's foremost experts in wildlife population sampling and model selection. Just earlier this year, he -- it was announced that he will be receiving the Wildlife Society's Aldo Leopold Award for distinguished service to wildlife conservation.

We asked Dr. Burnham a simple question. We said, "If the Court enjoins this X2 business in the fall, is that going to harm the delta smelt?" Look at all of these studies that both sides have cited, read the declarations submitted by experts on both sides and help us answer that question because

the Court's going to want to know and we're going to want you to look at them and tell him.

And he did that. He reviewed all of the available scientific data and he, too, independently reached the conclusion that there is no scientific evidence that an injunction is going to harm the delta smelt.

So, Your Honor, to summarize, on the issue of harm to the species, there is no reliable scientific evidence that the delta smelt is going to be harmed if this Court issues an injunction.

Now, just briefly, on the people. I don't think there's any dispute that hundreds of thousands of acre feet of water will be lost forever if this X2 is implemented in the fall. I don't think there's any dispute about that. Somebody might say, well, it's not a million, it's actually 642,000 acre feet of water. Whatever it is, it's enough water to supply millions of people for a year. And it is water that will be lost forever.

And here I think is the only point I need to make in opening statement. Anybody who lives in California or in the Central Valley, or who has been here for a long time, knows that, generally speaking, water is pretty important. It's a very important commodity. Some people will tell you it's more important than gasoline.

And we all know this has been a good water year. So

it's very easy for the government to say, "Gee, it's rained a whole lot, Your Honor, what's the big deal if we send a few hundred thousand feet of water away?" We've got a lot of water here and there, and look over there, there's water over there.

The key point is this: When was the last time that we had a wet year here in the Central Valley? It was five years ago, Your Honor, in 2006. And what happened between 2006 and this wet year? We all know, very little rainfall. And a lot of people struggled.

And the only reason we were able to survive those dry years is because we had a lot of water in reserve because somebody, certainly wasn't me, came up with the brilliant idea of saving water when it rains a lot so that you have it when you need it. And boy, we sure needed it.

And so what you will hear, Your Honor, is that today we have plenty of room to save this water. It is true we don't need the water for this year. We probably don't even need it for next year, but I'm not sure about that. But what is equally true is that frequently we have years where we don't have enough water, we've got to have it in reserve, and that's why we need it and that's why we need to save it.

Had we, five years ago, done what the government is proposing, had we, five years ago, diverted hundreds of thousands of water, just sent them down to the Golden Gate, we

would have had far more serious problems.

So just like people save money, Your Honor, when you have a good year financially, you got to do the same thing with water. And that's what we're saying here. We've got to save this water, we're going to need this water. And there is no reason to throw this water away. The delta smelt will not be harmed by injunction.

Thank you, Your Honor.

THE COURT: Thank you, Mr. Gonzalez.

Mr. Wilkinson.

MR. WILKINSON: Thank you, Your Honor.

Your Honor, in addition to the life cycle model results that are going to be presented by plaintiffs, we've also looked at the actual Fish & Game data that has been collected through a series of surveys including fall midwater trawl, 20 millimeter survey and other surveys that have been collected over the years -- conducted over the years by the Department of Fish & Game.

And the purpose of that analysis is to understand whether the X2 action is, in fact, related to the factors that underlie delta smelt abundance. Those factors are geographic distribution, survival, reproduction and food availability.

Now, Dr. Hanson, who will be called as one of our witnesses, did look at the fall midwater trawl data to determine the effect of the movement of X2 on these factors.

Something that the federal defendants never did. They never did that, even though the data was available to look at. But they simply didn't examine it.

As a result of the analyses that he has conducted, Dr. Hanson will explain those analyses in some detail for you. He concluded that, in fact, X2 is unrelated to delta smelt distribution, to its survival, to its reproductive capabilities the following year and to the availability of food. All of the factors that seem to be presumed by the fall X2 action and that underlie delta smelt abundance.

Dr. Hanson is also going to testify, Your Honor, about the most recent data we have concerning delta smelt abundance and their location. Something that we all know that the Court is very interested in. That data was issued and -- publicized, I should say, earlier this month. It came out on July 7th of 2011. And it's in the form of the summer townet survey results. These surveys are conducted every year by the Department of Fish & Game. And what they know is that in 2011, while the smelt numbers are still low -- there's no question that they are -- they have more than doubled compared to the numbers that were found last year.

And what Dr. Hanson is going to also testify to is that those numbers occurred following a fall period in 2010 in which X2 was not at kilometer 74, it was not at kilometer 81, it was between kilometer 83 and kilometer 84 from the Golden

Gate.

Moreover, the numbers that Dr. Hanson is going to testify about, this increase in summer townet survey, he will explain is an index number that is developed from the collection of data from certain core sampling stations within the Delta. That number does not include sampling stations which are located -- and I'll point these out on the map -- in the areas of Cache Slough, Liberty Island and the Sacramento Deep Water Ship Channel. None of those areas are included in the summer townet index number.

But what the Department of Fish & Game discovered this year, as early as -- or as recently as early this month, is that almost 60 percent of the delta smelt are located in those three areas. Cache Slough, Liberty Island and the Deep Water Ship Channel.

And what Dr. Hanson will also testify is that none of those areas are affected, the salinity in those areas are affected by the movement of X2. They are so far up and away from the two part per thousand or any other isohaline that they are fresh water areas. So the movement of X2 is not going to change the salinity in those areas.

More importantly, perhaps for the purposes of this proceeding, Dr. Hanson is also going to testify that not one of those areas was included in any of the papers, the publications that underlie the fall X2 action. Consistent --

THE COURT: What's been the historical consistency with these observations? Have there been any prior studies that show where, if there is any concentration, the delta smelt population concentrates?

MR. WILKINSON: In fact, there is an article that's attached as an exhibit to Mr. Feyrer's opposition declaration, an article by Mr. Kimmerer. And if you read that article, you will find that Mr. Kimmerer has found that there has been a major shift in the delta smelt population to areas in the northern Delta. These areas of Cache Slough, Liberty Island and the Sacramento Deep Water Ship Channel. He identifies those areas in that article.

And he says that he thinks that one reason for that shift is that what's happened in the southern Delta is that water -- as the clarity of water has become greater and the smelt doesn't have the cover that it used to have, that it appears that the smelt population is moving north. And he says that it also appears that they are moving farther away from the Delta pumps.

Now, it is a fact that until 2008, the fall midwater trawl and the summer townet -- the fall midwater trawl in particular did not sample in those areas. So we do not know how far back this shift goes. What we do know is that in 2009, 2010, 2011, they have been sampling in those areas and have been finding fish. And in this year, they're finding

that almost 60 percent of the delta smelt population total is in these areas outside of the influence of X2.

Now, one of the other basic premises that seems to underlie the fall X2 action is the notion -- you'll see this repeated in the biological opinion any number of times -- the projects have been responsible for moving X2 eastward. They have shrunk the habitat area available to the smelt.

And, in fact, the graphs that accompany the biological opinion, that are part of it, suggest the shift has been about 17 kilometers to the east. And the argument goes the X2 action is needed to reverse that. We need to get back to where we were before the pelagic organism decline began.

We're going to call Dr. Paul Hutton as a witness. Dr. Hutton currently works for the Metropolitan Water District as an engineer and a hydrologist. And prior to his employment with Metropolitan, he worked at the Department of Water Resources and for several years ran the modeling section, the Delta modeling section of DWR.

Dr. Hutton did something that none of the defendants' experts have ever done. He looked at the whole Dayflow record. He didn't take a piece of it. He didn't use a segmented portion of it or truncated part of the record, like the defendants have done. Instead, he went back to the full record which dates from the 1930s.

As Your Honor is well aware, we've had a number of

dry periods, including the 1928-1934 dry cycle. And what Dr. Hutton found, when he applied a well known equation called a Kimmerer-Monismith equation to the monthly average Dayflow data. He read that data and what he found was remarkable.

When you look at the full record, and not a truncated portion of the record, you find not only has there been no significant trend eastward over a period of 81 years, what you find instead is that in the month of September, the projects have actually shifted X2 westward, not eastward. It's not a large shift, but it sure as heck isn't kilometers to the east either.

In the month of October, it's been about neutral. X2 has moved eastward at the amazing pace of 0.02 kilometers per decade. Over the course of 80 years, that's less than two-tenths of a kilometer.

What the defendants did, in developing their fall X2 action, was they started looking at the Dayflow records in 19 -- 1987, I believe it was. 1967. And what we found is that they just happen to coincide with a very wet period of years. And what happened in the last 20 years is that we've had a relatively dry period. We've had relatively few wet years, relatively few above normal years.

And so what they've done to show the 17 kilometer shift is they compared the location of X2 in an unusually wet period to the location of X2 in an unusually dry period. Even

though they had a full 80 years of data and only used about half of it.

And you get a dramatically different conclusion when you look at the full scope of the data. Now, we are also going to put on Mr. Erlewine, Your Honor, to talk about the impacts within the State Project's service area. Mr. Erlewine supports the declaration testimony of Mr. Leahigh.

My information is Mr. Leahigh will confirm the initial numbers that were in his initial declaration which suggested that there would be an export reduction this year if X2 is triggered -- I'm sorry, next year it will actually take place -- of about 410,000 acre feet. He will indicate that the potential loss of water, in terms of storage at Oroville, is another roughly 440,000 acre feet. And these are probabilities.

I think you know that the projects operate based on probabilities. We don't have a crystal ball and we can't predict the weather. But those probabilities suggest that it's going to be a major impact on the state project. And what Mr. Erlewine will do is to describe for you how that impact will ripple through the state project service area.

We've just come out of a major drought. And during that drought, groundwater particularly was mined in order to keep agricultural operations going, in order to keep people in the urban areas supplied with water. We've been able to

refill some of that. We've been fortunate with the conditions that existed over the winter of 2010 and the winter of -- the early spring of 2011. We have a ways to go. Particularly with regard to groundwater in the San Joaquin Valley, we have a ways to go.

And this project that we represent, we are involved with, is one that, as you know, works conjunctively. It takes water when it's available and it puts it away into storage so we can get through the times when it isn't there. And if we aren't able, in a year like this, to make all the advantage, to make all the use we can of the available water, we can't operate conjunctively and we will be less prepared than we need to be come the next drought, which is inevitably going to happen.

Thank you.

THE COURT: Thank you, Mr. Wilkinson.

Mr. Sims.

MR. SIMS: Good morning, Your Honor. The federal contractors are here to support the motion for injunction. The evidence will show that enjoining fall X2 will not jeopardize the species. It will not prevent their recovery because maintaining fall X2 at 74 kilometers east of the Golden Gate does not benefit the species.

You've just heard the evidence that will be put forth on that issue. It will be primarily put on by the State Water

Contractors. But the federal contractors are also here to support -- and they have a vested interest in supporting that contrary to the federal defendants' assertions, the projects have not caused X2 to shift to the east as Mr. Wilkinson described.

Again, the state contractors will put on most of this information. The federal contractors are not taking the lead in this hearing because the State Water Projects will suffer the biggest water losses.

Based on the declaration of Mr. Snow that is submitted -- or that has been stipulated by the parties, CVP exports will not be impacted unless the Bureau of Reclamation forecast is wrong and the Delta inflows are lower than projected.

In the event that inflows occur using the 90 percent exceedence projections instead of the current projected 50 percent exceedence, the fall X2 action would require 160,000 acre feet of pumping curtailment in October and November in the CVP.

This water loss, like the larger water loss suffered by the State Water Project, has a significant impact to human population reliant on the projects.

In addition, the water users will have a reduced ability to replenish groundwater depleted during the recent drought years. As the Court's aware, there has been a

subsidence issue, a subsidence problem because the overdraft of the groundwater aquifers. This is our opportunity to replenish that overdraft.

Finally, the federal contractors have a vested interest in seeing that this Court's judgment regarding fall X2 is honored. Imposition of fall X2 is contrary to the spirit and the intention of the judgment.

Thank you.

THE COURT: Thank you, Mr. Sims.

Mr. Lee.

MR. LEE: Your Honor, Clifford Lee on behalf of the Department of Water Resources. For the sake of time, we will waive opening argument and reserve our time for close.

I would like to confirm and note your comments at the beginning, the Department of Water Resources will be putting a witness on, Mr. Leahigh, to address the impacts of State Water Project operations, including water supply impacts of the implementation of fall X2 this year.

THE COURT: To pick a nit, as always, it's an opening statement. The argument is reserved for the closing.

All right. Are the federal defendants -- is that all -- all the plaintiffs have been heard?

MR. GONZALEZ: Yes, Your Honor.

THE COURT: Yes. Mr. Williams, are you going to present this?

MR. WILLIAMS: Yes, Your Honor.

THE COURT: You may proceed.

MR. WILLIAMS: Thank you, Your Honor. Robert Williams on behalf of the federal defendants. I'd like to begin with the likelihood of irreparable harm to the plaintiffs. Because I think that's where the Court's inquiry can start and end.

You know, as the Supreme Court has held, in no uncertain terms, irreparable harm, when we're talking about the extreme relief that an injunction entails, requires a showing of likely irreparable harm. It's not enough for the harm to be possible, the moving party has to establish that it's likely. And the definition of "likely," according to Merriam-Webster, is "having a high probability of occurring or being true. Very probable."

Here, Your Honor, the evidence will not show that irreparable harm to plaintiffs is likely unless Action 4, the fall action, is enjoined.

First, with respect to the CVP. There will be no water impacts this year. And that bears repeating, Your Honor. No water impacts to the CVP this year. And there's a good chance that there won't be any impacts next year.

The only way there would be impacts next year is if it turns out to be a dry year. And of course, we don't know, sitting here today, whether or not that will happen. But it's

at least as likely that next year will not be a dry year as it is that it will be a dry year and the chances might even be greater that next year there will be no water impacts. So if there's sufficient precipitation next year, there will be no impact.

With respect to the SWP, the factual circumstances are slightly different, but the end result is the same. In terms of water deliveries, the allocation decisions for this year have already been made. So an injunction can't redress any irreparable harm that's alleged to occur this year.

So like the CVP, plaintiffs' entire showing for the SWP of likely irreparable harm that can be addressed by injunction rests on the potential for impacts next year. But the likelihood of those impacts is anything but certain.

In terms of storage of water that could be used next year, there will be no impacts to the SWP from implementing Action 4 this August and September.

And, Your Honor, for October and November, the impact of any losses to storage for next year depend entirely on future hydrology. At this point, all anyone can do is speculate as to what that hydrology may be.

It's just as likely that Lake Oroville water storage lost as a result of the fall X2 action will be replenished as it is that there will be lasting storage impacts.

So, Your Honor, what this boils down to is plaintiffs

are asking you to enjoin the fall X2 action component of the RPA based entirely on speculation, on the mere possibility that there might be future water impacts next year. And we think Supreme Court precedent forbids issuing an injunction under these circumstances.

And what's more, even if plaintiffs could show a likelihood of irreparable harm, there's an additional threshold hurdle that the evidence will be show here. And that's causation. There will be no evidence that shows that the BiOp, much less the fall X2 action that plaintiffs are currently seeking to enjoin, is going to cause rampant unemployment in the San Joaquin Valley or other widespread economic injuries that plaintiffs allege.

So as I said a moment earlier, I think the Court's inquiry can start and end with the issue of likely irreparable harm to plaintiffs.

It's clear, Your Honor, that the anxious -- that the plaintiffs are anxious to present their new witnesses to the Court. Dr. Deriso, Dr. Burnham, Dr. Hanson, Dr. Hutton, and all the new analyses and theories that they've come up with since summary judgment. But, as I said, the Court can resolve this matter without even reaching that testimony.

But apparently plaintiffs' attack is two fold here. They want to use this new -- these new theories, these new arguments to bolster their attacks that failed at summary

judgment and also to try and overcome a weak showing of likely irreparable harm. The law, however, does not allow this weak showing of likely irreparable harm to be overcome by a strong showing on the merits.

So we don't think that the Court even needs to reach the testimony that goes to the scientific bases for X2. But even if the Court were to reach that evidence, we don't think that the evidence will show there's any grounds for enjoining the fall X2 action.

Your Honor, let's take stock of where we find ourselves today. First, let's consider the current condition of the delta smelt. The species is on the brink of extinction. There's no dispute about that. The Fish & Wildlife Service has found that an endangered list for the smelt is warranted but precluded by other listing activities.

Next, let's consider the fundamental conclusions of the BiOp. There were two of them. And I think it's important to keep in mind that there are two separate findings of the BiOp.

The first is that the project operations are likely to jeopardize the smelt's continued existence. And the second conclusion is that those project operations are likely to adversely modify its critical habitat. And this Court has upheld both of those conclusions.

So it's important to keep in mind these two separate

conclusions, because plaintiffs will say very little about adverse modification of critical habitat. And that's a separate requirement of the ESA. They want to make this all about jeopardy. And if they can show that enjoining fall X2 will not cause jeopardy, then it should be enjoined.

But there's another requirement, which is adverse modification of critical habitat. And as long as Action 4 is necessary to prevent adverse modification of critical habitat, then it cannot be enjoined, regardless of the jeopardy analysis.

So, Your Honor, that's where we are. We have the species on the brink of extinction and project operations that, if left unmitigated by the RPA, are likely to threaten the species' continued existence and adversely modify its critical habitat.

And the evidence will show that what prevents this jeopardy and adverse modification of critical habitat is the RPA that Fish & Wildlife and Reclamation have carefully crafted.

Your Honor, you will hear from two preeminent Bay Delta fish biologists, Frederick Feyrer, who works for the Bureau of Reclamation, and Matthew Nobriga, who works for Fish & Wildlife. Mr. Feyrer and Mr. Nobriga have done something that none of the plaintiffs' witnesses have done. That's actually to go out into the Delta and conduct original

research on the delta smelt and its habitat.

Mr. Feyrer and Mr. Nobriga's research has resulted in numerous peer reviewed published articles. These witnesses will explain and the evidence will show that it's important to protect the smelt's fall life stage because that's when the species is gearing up to begin its migration to its spawning grounds in the winter.

So by improving conditions in the fall, we give the chance for the species to recover and rebound from past dry years. And for an annual species like the smelt, it can't fall back on other year classes to make up for poor conditions in prior dry years.

So that's why it's particularly important this year, in a wet year, that it's given this chance to rebound by increasing its likelihood of successful reproduction and recruitment this coming spring.

So the evidence will show there's two ways -- that the way to improve the conditions this fall is to ensure the X2, which represents a salinity level of two parts per thousand and is a habitat indicator for numerous estuarine species, including delta smelt, is maintained at an average of 74 kilometers east of the Golden Gate Bridge.

That kilometer location ensures that the low salinity zone coincides with Suisun and Grizzly Bays, which have conditions that are favorable to delta smelt. Those areas

provide the smelt with greater amount and quality of habitat than is available at more easterly locations upstream of the confluence of the Sacramento and San Joaquin Rivers.

And the reason for this is that delta smelt are estuarine dependent and will center their distribution on the location of X2. So maintaining X2 at 74 kilometers this year will distribute them into good habitat conditions.

Conversely, if X2 is allowed to recede too far east of the Golden Gate Bridge past 81 kilometers, it would force delta smelt to occupy narrow deep river channels, thereby restricting it to smaller area of low quality habitat during this life stage.

The evidence will show that this is not just speculation on Fish & Wildlife's part. Fish & Wildlife did not grab 74 kilometers and 81 kilometers out of a hat, Your Honor. There's evidence of an association between X2 and fall habitat conditions for delta smelt and their abundance.

In fact, the evidence will show that the lowest recorded abundances of delta smelt have occurred to correspond with periods when habitat for delta smelt was most restricted.

Your Honor, you'll hear from the acting field supervisor for the Fish & Wildlife Service Bay Delta Office, Dr. Jennifer Norris. And she will explain that the RPA is necessary to not only avoid jeopardy, but also adverse modification of habitat.

As I mentioned a moment ago, these are two separate requirements of the ESA. And Dr. Norris will explain that vacating Action 4 will remove a key element of the RPA designed to present jeopardy and adverse modification from happening. Dr. Norris will explain that Action 4 is the only component of the RPA that addresses the smelt's biological needs during the fall life stage.

Plaintiffs will not present a compelling reason to eliminate these important protections of Action 4. For instance, Your Honor, you'll hear from plaintiffs' witness, Dr. Deriso, and he'll offer his opinions based on a new life cycle model that he crafted after the BiOp was prepared.

And in their papers, plaintiffs have been quick to crown this life cycle model as the best available science. They use words like definitive, conclusive, when describing Dr. Deriso's life cycle model. They think it forecloses any contrary points of view, that it puts an end to any scientific debate.

But the evidence will show that the results of a model, including Dr. Deriso's model, are simply a function of how the model was set up and what data inputs the creators chose to use.

So for those reasons, different models can and do produce different results. The evidence will show that other life cycle models for the delta smelt have been conducted and

taken different approaches and have come to different conclusions than Dr. Deriso's model about the relative importance of factors affecting the smelt.

And I think Mr. Gonzalez mentioned two of those other life cycle models. Mr. Feyrer, whose work is the focus of many of plaintiffs' attacks today, was a co-author on both of those life cycle models and Your Honor will hear from Mr. Feyrer, who will explain his work on those.

So what all this shows, Your Honor, is there's no single paper or model that's the final say on this, the final truth. And given the amount of scientific disagreement, no reasonable resource manager would base his decisions on a single paper or single model or single piece of evidence.

I think the scientific disagreement over the life cycle models tipifies this entire evidentiary hearing. Plaintiffs and their witnesses will offer their opinions, but at the end of the day, they're just that. They're their opinions.

The evidence will show that there's evidentiary support for the fall X2 action and the fact that plaintiffs hold contrary opinions does not erase that evidence, does not erase that support.

When the bases for these attempted criticisms that plaintiffs' witnesses will offer are brought to light, the criticisms by Dr. Burnham, Dr. Hanson, Dr. Hutton, the

evidence will show that these criticisms are either not supported by the analyses that were performed, that these criticisms were based on invalid data or the wrong kind of analyses to answer the questions that these witnesses were trying to answer.

So in sum, Your Honor, Congress has charged the federal agencies with implementing project operations in a way that complies with the ESA and they are doing that in a reasoned, in a rational and in a responsible manner. The Court should not substitute its judgment or the mostly unreviewed opinions of plaintiffs' witnesses for the well reasoned and extensively peer reviewed judgment of the expert agencies.

Thank you, Your Honor.

THE COURT: Thank you, Mr. Williams.

Mr. Orr, Ms. Poole?

MR. ORR: Good morning, Your Honor, we concur in the opening statement that the federal defendants made. And in the interest of time, we will waive a separate statement of our own.

MS. POOLE: We will as well, Your Honor. Thank you.

THE COURT: Thank you very much.

All right. You may call your first witness.

MR. GONZALEZ: We call Dr. Richard Deriso.

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RICHARD BRUCE DERISO,
called as a witness on behalf of the Metropolitan Plaintiffs, having been first duly sworn, testified as follows:

THE CLERK: Please have a seat. And when you do, state your full name for the record and spell your last.

THE WITNESS: My name is Richard Bruce Deriso, Deriso is spelled D-E-R-I-S-O.

THE COURT: You may proceed.

MR. GONZALEZ: Thank you, Your Honor.

Your Honor, for the record, Dr. Deriso was previously qualified by this Court on April 6th, 2010 as an expert on fish population dynamics, quantitative analysis of fish populations and modeling of fish populations and dynamics.

DIRECT EXAMINATION

BY MR. GONZALEZ:

Q. Good morning, Dr. Deriso.

A. Good morning.

Q. First an administrative point. There are two exhibits in the binder before you. Exhibits 3 and 5. Are those the two declarations that you signed in connection with this motion, one dated June 16, the other July 15, 2011?

A. Yes.

MR. GONZALEZ: Your Honor, we would move exhibits 3 and 5 into evidence.

THE COURT: Any objection?

MS. POOLE: No objection, Your Honor.

MR. EDDY: Subject to our objection in the motion to strike, Your Honor.

THE COURT: All right. Thank you. I have ruled substantively on those. Therefore, the Exhibits 3 and 5 are received in evidence.

(Metropolitan Plaintiffs' Exhibits 3 and 5 were received.)

BY MR. GONZALEZ:

Q. Doctor, when you testified in this courtroom on April 6th last year, one of your concerns for the BiOp was that the government did not prepare a life cycle model. Do you recall that?

A. Yes.

Q. Since you last testified in this courtroom, have you done additional work on the life cycle model that you had been working on at that time?

A. Yes.

Q. Is this an expansion of the life cycle model that you testified about previously that you had prepared in December of 2009?

A. Yes.

Q. And did you prepare a written paper based on your work?

A. Yes.

Q. And that is attached, for the record, as Exhibit A to

Exhibit 3, your original declaration in this proceeding?
A. Yes.
Q. Have you submitted that paper for publication?
A. Yes.
Q. To whom?
A. Canadian Journal of Fisheries and Aquatic Sciences.
Q. Is that a peer reviewed journal?
A. Yes.
Q. Is it respected in your profession?
A. Yes.
Q. And what's the status of its publication?
A. It's been published. It's available online. Printed copy should be out shortly.
Q. And footnote 2 of your reply declaration, Exhibit 5, has the online address so that if anybody wants to look at it, they can?
A. Yes.
Q. You had a co-author in that publication, Dr. Mark Maunder?
A. Yes.
Q. Why did you choose Dr. Maunder as your co-author?
A. Dr. Maunder is the main developer of several fishery stock assessment models. He is currently the head of our stock assessment group at the Inter-American Tropical Tuna Commission. He has consulted with a number of foreign governments. He's taught graduate courses. He has over 40

publications. Just a really top notch scientist.
Q. Doctor, the model that you and Dr. Maunder created is called a state-space multi-stage life cycle model?
A. That's correct.
Q. Can you tell us briefly what that means.
A. Yes. A life cycle model is a model which mathematically models the entire life cycle of an animal from adults to their offspring, as they grow up, as they become adults and so on, completing the entire cycle.

It's a multi-stage because we have multiple surveys on the delta smelt. We have -- and so we partitioned the life history into these multiple stages going from the fall, and the fall midwater trawl survey to the spring, for the larvae juvenile in the 20 millimeter survey. And the summer juveniles, as measured with the summer townet survey.

The state space part of it refers to a particular statistical approach to estimating the parameters for such a model. And the advantage of the state space modeling approach is that it explicitly accounts for both observation error and natural random variability in the population's dynamics.
Q. Why did you choose that particular model for analyzing delta smelt?
A. That particular model is capable of utilizing an array of surveys, as I've discussed. And so that you can more closely tailor testing of environmental factors with a particular life

stage that you would expect that it would -- or that it could affect.

The estimation technique more formally addresses that, in fact, there are errors in these surveys, and so you want to take that into account. There is also natural variability in the dynamics, so you would like to take that into account as well.

Q. Is this the type of life cycle model that, in your view, the Fish & Wildlife Service should have prepared as part of its work on the BiOp?

A. Yes.

Q. Doctor, would you please tell the Court what specifically you did to update your work on this life cycle model since you last testified?

A. When I last testified, we had initially developed a model in December of '09. And we had used a simpler estimation method with it. One which was essentially so simple that I could actually implement the thing on an Excel spreadsheet. This version is more complex, requires more complex software to do what I think is a better job at the estimation.

Q. Part of your update included a mathematical process to determine what was harming the fish?

A. Yes. We structured it so that we could do essentially hypothesis testing about some candidate environmental factors to see if they were important in accounting for the changes in

the -- to population's growth rate and particularly in the decline of delta smelt.

Q. And did you then apply the process?

A. Yes.

Q. And based on the work that you did with Dr. Maunder, did you reach a conclusion as to what the data indicated were important factors relevant to determining what was causing the decline in the delta smelt population?

A. Yes.

Q. And please tell the Court what conclusions you reached.

A. What we found in their model selection process was that three kinds of environmental factors turned out to be quite important. One was the food abundance in the spring as measured zooplankton index. Also in the spring, the water temperature is important. The fall, the predation index was also important. Those were the three sort of main environmental covariates that were important.

Q. What about density dependence?

A. Yeah, density dependence also turned out to be important.

Q. And you say "food abundance," is that sometimes referred to as prey abundance?

A. Yes.

Q. And that seems pretty obvious, that there's no food, it's hard for the fish to survive. Is that basically the point?

A. Yes.

Q. And with respect to predation, those are predators, bigger fish that would eat the smelt?
A. That's correct.
Q. And temperature in spring, can you tell me what is your understanding as to why that would be a factor?
A. A fish's metabolic rate is a function of temperature. The warmer the temperature, the higher the metabolism, the higher the need for food consumption is. It's -- and if it gets too high, then you just get into a zone where they're just going to die.
Q. And density dependence, what is your understanding as to why that would be a factor?
A. Density dependence is a fundamental factor of population regulation in all the animals. And essentially that is the mechanism which prevents a population from growing exponentially and overpopulating the world with its kind.

And the mechanisms of density dependence vary. Certainly limitations because of habitat size, increased number of individuals, they compete between each other for the available food, they can deplete the food supply because of an overabundance. That sort of thing.

Q. Doctor --

THE COURT: All right. We're going to take, at this time, the morning recess. We will stand in recess until 20 minutes after 10.

MR. GONZALEZ: Thank you, Your Honor.

THE COURT: You may step down.

(Recess.)

THE COURT: We're going back on the record in the delta smelt consolidated cases. We're going to resume the testimony of Dr. Deriso. Mr. Gonzalez, you may continue.

BY MR. GONZALEZ:

Q. When we broke, Dr. Deriso, you were talking about the conclusions that you and Mr. Maunder reached about what was causing the decline in the delta smelt population. As part of your work with Dr. Maunder, did you analyze X2 --

A. Yes.

Q. -- to see -- let me --

A. Excuse me.

Q. Let me just complete the question.

Well, did you analyze it as part of your work with Dr. Maunder?

A. Yes.

Q. And did you come to any conclusion as to whether or not there was a relationship between it and the delta smelt's population decline?

A. Yes.

Q. What conclusion did you reach?

A. X2 was not an important factor.

Q. Are you aware of any scientifically reliable model that

indicates that X2 contributes to the delta smelt's population decline?

A. No.

Q. Doctor, with respect to habitat, as defined by the X2 proposal, has the government, in your view, demonstrated that that is critical habitat necessary for the survival of the species?

A. No.

Q. Doctor, based on your work, is there any --

THE COURT: Well, let's back up. How do you understand the government to define critical habitat?

THE WITNESS: Yes, Your Honor. I don't know how the government defines it. It's my understanding that critical habitat is habitat necessary for the survival of the species.

THE COURT: Yes. And if you assume that the government defines it as including Sacramento River to and including the area that reaches the Golden Gate Bridge, do you have that in mind?

THE WITNESS: I have in mind the location of the delta smelt as measured by the surveys. And they are, of course, in the low salinity zone, which would go up to like nine parts per thousand or so. So they're in that part of the system. And rather widely distributed.

THE COURT: And geographically, what area is that?

THE WITNESS: Well, they can go as far west as down

into Suisun Bay. Then as we've heard, they've now -- they've expanded the surveys, they're finding them far up in the fresh water. And certainly when they're in their spawning period, then they will move into the fresh water portions of the system.

THE COURT: And where is that?

THE WITNESS: The location of the delta smelt as indicated by the 20 millimeter survey, for example, so this is a very young offspring is -- they are in both the east Delta as well as the western part of the Delta. It's all up in the more fresh water areas of the system.

THE COURT: And our question is to try to describe, by geographic reference, where in the Delta that is. In other words, east and west, but in relation to how far from any established landmarks or designated area?

THE WITNESS: Well, certainly they're in the spawning cycle into the fresh water. So wherever there is fresh water, there could be delta smelt. They shift their geographic distribution from one year to the next.

For example, this year they were located further west than they have been in other years.

THE COURT: You may continue.

MR. GONZALEZ: Thank you, Your Honor.

Q. Doctor, just wrapping up this topic. Based on your work, is there any reasonable scientific basis for concluding that

the delta smelt will be harmed if the fall X2 action is not implemented?

A. No.

Q. Now, let me shift gears a little bit and ask you a few questions about the work of Mr. Feyrer. You've read the BiOp and Mr. Feyrer's article from 2008 that's referenced in the BiOp?

A. Yes.

Q. Hopefully your screen is --

A. It works.

Q. Great. I am putting up on the screen, Your Honor, an excerpt from page 236 of the BiOp. The BiOp being Exhibit 1.

In fact, for the record, Your Honor, I should move the BiOp, Exhibit 1, into evidence.

THE COURT: Any objection? I mean, it's judicially noticeable.

MS. POOLE: No objection.

MR. EDDY: No, Your Honor.

THE COURT: Exhibit 1 is received in evidence.

(Metropolitan Plaintiffs' Exhibit 1 was received.)

BY MR. GONZALEZ:

Q. And you'll see there that there is a reference in the BiOp to Mr. Feyrer's article of 2008. It says, "The model relating X2 to delta smelt abundance was updated from that developed by Feyrer, et al. 2008."

And you've read the 2008 article?
A. Yes. The manuscript.
Q. If you will turn to Exhibit 6A in your binder. There should be some excerpts from Mr. Feyrer's 2008 article.
Are you familiar with these two excerpts?
A. My exhibit number 6 contains --
Q. 6A. Is there a 6A?
A. Oh, excuse me. 6A. Got you. Okay. Got you.
Yes. I see the parts there.
Q. And you recognize these as being excerpts from Mr. Feyrer's 2008 article?
A. Yes.
Q. There's a reference to a Table 1. Do you see that?
A. Yes.
Q. Is that also attached to Exhibit 6A in your binder?
A. Yes.
Q. And you also have attached to Exhibit 6A, Figure 3 from Mr. Feyrer's 2008 article?
A. Yes.
MR. GONZALEZ: Your Honor, I move Exhibit 6A into evidence.
THE COURT: Any objection?
MS. POOLE: Yes, Your Honor. Counsel has not provided us with a copy of the binder, so I can't tell whether the full document that he is using excerpts of has also been

provided. I do want to make sure that is in evidence.

MR. GONZALEZ: All right.

THE COURT: All right.

MR. GONZALEZ: We can back up.

Q. If you can look at Exhibit 6.

A. Yes.

THE COURT: Well, the question is do the defendant intervenors and the federal defendants have the exhibit?

MS. POOLE: We have not been provided a copy of the binder that the witness and the Court have been provided. No, Your Honor.

MR. GONZALEZ: I'll give them a copy of this exhibit, Your Honor, 6A.

THE COURT: And is the underlying data on which he relies also in this exhibit you've just handed them?

MR. GONZALEZ: Exhibit 6A, Your Honor, which I believe is in the Court's binder, is simply excerpts from Dr. -- or Mr. Feyrer's article. It's the two excerpts --

THE COURT: Does it include Table 1?

MR. GONZALEZ: Yes, it does, Your Honor. Table 1 and also Figure 3.

MS. POOLE: And Your Honor, if I --

THE COURT: Yes.

MS. POOLE: -- may clarify. My objection is to whether the complete Feyrer 2008 article is also being moved

into evidence. We would like the complete study.

MR. GONZALEZ: The answer is yes.

THE COURT: All right. Under the rule of completeness --

MR. GONZALEZ: We have no problem with that.

THE COURT: -- Rule of Evidence 103, if we have it, let's mark it and admit it into evidence. The Feyrer article. The whole thing.

MR. GONZALEZ: Your Honor, it's already in our binder as Exhibit 6.

THE COURT: All right.

MR. GONZALEZ: So I would move Exhibit 6 and 6A into evidence at this time.

THE COURT: Any objection?

Exhibit 6 and 6A are received in evidence.

(Metropolitan Plaintiffs' Exhibits 6 and 6A were received.)

BY MR. GONZALEZ:

Q. All right. Doctor, now turning to Exhibit 6A. I've just gone over the two references and the Table 1 and the figure.

Are you familiar with the final article that Mr. Feyrer published based upon the 2008 draft that is referenced in the BiOp?

A. Yes.

Q. And if you'd turn to tab 7 in your binder. Is that the

final article that was published by Mr. Feyrer?
A. Yes.
MR. GONZALEZ: Your Honor, I move Exhibit 7 into evidence.
THE COURT: Is it the whole article?
MR. GONZALEZ: Yes, it is.
THE COURT: Any objection?
MR. EDDY: No, Your Honor.
THE COURT: Exhibit 7 is received in evidence.
(Metropolitan Plaintiffs' Exhibit 7 was received.)
BY MR. GONZALEZ:
Q. Now, going to try to do this as quickly as possible. But if you look at the words on your monitor, which come from Exhibit 6A, which are words that were contained in the draft. There's a reference that says, and I'll quote just part of it. "The amount of available habitat has affected delta smelt abundance during 1987-2007." And then it references Table 1.
Are these words on the screen that I just read in the final Feyrer article?
A. No.
Q. And the Table 1 that is referenced by Mr. Feyrer, that is attached to Exhibit 6A, is that contained in his final article?
A. No.
Q. And if you look at the words at the bottom of Exhibit 6A,

which I put up on the monitor, I'll read just parts of it. "Manipulations of autumn X2 could result in substantially different population levels of delta smelt."

Are those words contained in the final Feyrer article?

A. No.

Q. And if you'll turn to the last page of Exhibit 6A, which is also the last page of Exhibit 6, the 2008 draft, there is a figure that had been included in Mr. Feyrer's 2008 draft, which is Figure 3. At the bottom, for the record, it says, "X2 management scenarios." Are you familiar with this figure?

A. Yes.

Q. Can you tell the Court, just briefly, what it purports to represent?

A. These are four hypothetical scenarios about what X2 management -- the X2 management would be in the future. This is done by applying the life cycle model that was in the 2008 manuscript and doing a computer simulation of potential population trajectories into the future under each of these X2 management scenarios.

Q. Is Figure 3, from the 2008 draft, included in the final published article by Mr. Feyrer, which is Exhibit 7?

A. No.

Q. Is there any explanation in Mr. Feyrer's final published article as to why these words and graphs that I'm showing you

are not included in the final article?
A. No.
THE COURT: I'm going to ask a question. If you can back up to the last exhibit. When the term "manipulation of X2" is used, do you have any understanding of what that means?
THE WITNESS: Yes. My understanding of that is that it's in reference to Figure 3. And the manipulations that they're talking about are these alternative management scenarios that are simulated that ended up in the results in Figure 3.
THE COURT: And the alternative management scenarios, what do you understand those to be?
THE WITNESS: These are different levels of X2. They are proposing either just completely random or high X2, but still randomized, a lower X2 but still randomized.
THE COURT: And higher or lower means what in this context?
THE WITNESS: The specific details of it are not at the top of my head right now, I'm sorry. They're in the text. And I could look it up for you very quickly, because it's just a matter of --
THE COURT: Well, does "higher" mean further from the --
THE WITNESS: Further up, yes.
THE COURT: -- Golden Gate Bridge?

THE WITNESS: Yes.
THE COURT: "Lower" means closer?
THE WITNESS: Yes. Yes.
THE COURT: All right. You may continue.
MR. GONZALEZ: Thank you, Your Honor.
Q. Doctor, is there anything in Mr. Feyrer's final article, Exhibit 7, that in your opinion can support an argument that the delta smelt will be harmed if X2 is not implemented?
A. No.
Q. Doctor, in this Court's December 14, 2010 order, at page 221, the Court wrote, quote, "The BiOp has failed to sufficiently explain why maintaining X2 at 74 kilometers" dot dot dot "is essential to avoid jeopardy."
Even if one were to assume that X2 is a reasonable basis for determining delta smelt habitat, even if we just assume that for sake of argument, can you find a reasonable place to put X2 based on Mr. Feyrer's final published article?
A. No.
Q. Is there anything in that article that, in your view, would support maintaining X2 at 74 kilometers?
A. No.
Q. Doctor, now switching gears to other articles. Are you familiar with the two articles published last year by MacNally and Thomson?
A. Yes.

Q. And are they Exhibits 9 and 10 of your binder?
A. Yes.
MR. GONZALEZ: Your Honor, we move Exhibits 9 and 10 into evidence.
THE COURT: Are they complete articles?
MR. GONZALEZ: Yes, Your Honor.
THE COURT: Any objection?
MR. EDDY: No, Your Honor.
THE COURT: Exhibits 9 and 10 are received in evidence.
(Metropolitan Plaintiffs' Exhibits 9 and 10 were received.)
BY MR. GONZALEZ:
Q. Can you tell the Court, just briefly, what those two articles by MacNally and Thomson examine?
A. They did an analysis -- it's, I think, the same authors in both of the articles. And both of the articles are looking at biotic, that is biological and abiotic, like temperatures, salinity and such, factors to see if they can determine which of those are responsible for the decline in these four pelagic fish species. The four, one of them includes delta smelt. You have striped bass, longfin smelt and threadfin shad, I believe.
Q. Among other things, did the articles examine the spring and fall X2?

A. Yes. They did.
Q. And do either of those papers find any connection between X2 and the delta smelt's population decline?
A. No.
Q. Is Mr. Feyrer a co-author of both of those papers?
A. Yes.
Q. And also Ken Newman, who has served as an expert for defendants in this case, is he also a co-author of both of those reports?
A. Yes.
Q. So we talked about your model, the articles authored by MacNally and Thomson. Are you aware of any study or article that has been published since you last testified that finds a connection between X2 and the decline of the delta smelt?
A. No.
Q. Are you aware of any study or article published since you last testified that finds a connection between the location of X2 and the decline of the delta smelt?
A. No.
Q. Doctor, do you understand that our client is asking this Court for an injunction to bar the implementation of the fall X2 action?
A. Yes.
Q. And do you understand that one of the questions that this Court has to consider is whether an injunction would harm the

delta smelt?
A. Yes.
Q. If the Court were to ask you whether, in your opinion, an injunction would harm the delta smelt, what would you say?
A. I would say no. I mean, I've looked at the available scientific data on this species. I've done a number of analyses. And there really is nothing out there to show that X2 is going to have an effect on the species' survival.
MR. GONZALEZ: Thank you. That's all I have, Your Honor.
THE COURT: What is your analysis of the impact of X2, first of all, on the smelt?
THE WITNESS: The analysis --
THE COURT: Delta smelt.
THE WITNESS: On the delta smelt, the analysis that we've done with our life cycle model was to look at fall X2 and specifically to address whether or not it was an important environmental covariate in the model. Specifically does it improve the fit of the model to the observed data. And the answer is no, it doesn't.
THE COURT: And in terms -- are you qualified to opine on whether the salinity level at location, wherever it is, how that affects the delta smelt?
THE WITNESS: As I have said, Your Honor, what I have done is used the existing data, used the X2 data series,

applied this to a life cycle model. And I do not find it to be an important factor for the entire time series analysis, going from 1970 through 2006.

THE COURT: And so, from a fish biology standpoint, the salinity level, at least at the levels that X2 have been measured in the 80 years of data, in your opinion do not have an effect on the species?

THE WITNESS: Certainly not on the survival of the species. I have found no evidence that it impacts the population growth rate and the survival of the species.

THE COURT: And the reason or reasons for that?

THE WITNESS: The delta smelt reside in different geographical parts of the system in different years. And if it is too saline for their taste, then they may shift their geographical distribution. But that doesn't mean that it affects their survival.

I mean, when you're looking at factors affecting survival, it's not just salinity. You've got to take into account what the prey abundance is like, what the predation pressure is like. You have things like turbidity that can be used to shield the delta smelt from predators. And then, of course, you have contaminants.

So there's really multiple factors that define the habitat of delta smelt. And that may be the reason why something as simple as X2 just doesn't work.

THE COURT: And is your understanding of the premise of this X2 RPA that the reason for this measure is to increase the abundance of habitat for the species?

THE WITNESS: I believe it says something like that.

THE COURT: And is the opinion that you have rendered that there is enough, in other words, saline safe -- we'll use that lay term -- habitat, meaning water, whatever it is, channel, deep, shallow, stream, where the fish can exist?

THE WITNESS: Yes. Certainly at -- especially at these abundance levels. We're talking about a species which is admittedly depleted. And so you're at a low population level. So you -- on the face of it, you wouldn't expect that the size of the habitat is going to be a constraint on the species.

Now, if they get very abundant again, then you may have an argument that increasing available habitat is going to influence the species. But certainly not at these levels of abundance.

THE COURT: Well, if one of the objectives of the law is to increase the abundance of the species, what is your opinion about the present X2 RPA in terms of increasing the species. Not just enabling it to survive.

THE WITNESS: I don't think it's going to have an influence on the survival of the species, certainly in this year. In this period of time.

THE COURT: Because there is enough habitat?

THE WITNESS: Because there's plenty of habitat. And habitat is not a constraining factor.

THE COURT: You may proceed.

MR. GONZALEZ: Thank you, Your Honor. That's all the questions we have at this time.

THE COURT: All right. Any other plaintiff wish to question this witness?

MR. WILKINSON: No, Your Honor.

THE COURT: Cross-examination.

MR. EDDY: Thank you, Your Honor.

I'm going to be using the Elmo. So I'd like to be sure it's working. Just a couple of preliminary matters, Your Honor. We've prepared a courtesy copy binder set of all exhibits that the defendant parties plan to use and have identified on their exhibit list for you. We haven't made one for all parties. We'd be handing out those individually. But I do have a set for you if that would --

THE COURT: Yes.

MR. EDDY: -- be convenient.

THE COURT: That would help. Thank you.

MR. EDDY: I'd also ask for the Court's permission for my colleague, Mr. Williams, to approach the witness and the courtroom deputy.

THE COURT: Yes, you may.

CROSS-EXAMINATION

BY MR. EDDY:

Q. Good morning, Dr. Deriso.

A. Good morning.

Q. We met in this courtroom once before. I'm Ethan Eddy, I'm an attorney with the United States Department of Justice. And I'm one of the lawyers for the defendant agencies in this case.

To start us off, Dr. Deriso, are you being paid for your work on this case?

A. Yes.

Q. And are you being paid for your testimony here today?

A. Yeah, I'm going to charge them for my time.

Q. And that's an hourly rate, I assume.

A. Yeah.

Q. And which of the parties is paying for your time?

A. Metropolitan Water District.

Q. And can you give us the hourly rate, please, sir?

A. $200.

Q. In addition to that hourly rate, is there any sort of flat fee or retainer arrangement?

A. No.

Q. Is there any sort of a cap on your fee amount?

A. The total aggregate of the charges with Metropolitan Water District is currently -- there's a total cap, I think, of

500,000. That's not just for delta smelt, but everything I do for them.

Q. Thank you, sir.

Dr. Deriso, you wouldn't consider yourself a delta smelt biologist; would you?

A. No.

Q. Have you ever worked on a biological opinion?

A. No.

Q. And have you done any work at all pertaining to the delta smelt prior to this litigation?

A. No. Well, strike that. I -- I was a party to a panel that was ad hoc assembled in March of 2009 to look briefly at the delta smelt.

Q. Can you tell us who assembled that panel?

A. I don't know, perhaps the judge can tell me. Dr. Rob Roy Raynor was the contact. The person who contacted me to assemble this panel.

Q. And is this -- was this some sort of an administrative hearing?

A. No, no. This was an ad hoc panel to offer our thoughts on some of the work that had been written about -- about the delta smelt.

Q. So it was like a public speaking event?

A. Yeah, sort of like that. Sort of like a -- it was -- yeah, it was at the university auditorium and very ad

hoc.
Q. Do you recall, doctor, whether any environmental advocacy groups were also invited to participate in this panel?
A. I didn't -- oh, as a part of the panel? No, I don't believe so. I believe they were all scientists.
Q. And this -- and this panel, you said, pre-dated this litigation?
A. Well, I mean, it depends on what "this litigation" is. The litigation I've been involved with since 2009 started in July. It pre-dates that.
Q. Thank you. Let's talk briefly about the life cycle model that you developed with Dr. Maunder. I believe you testified earlier this morning that a manuscript reporting the results of the model was recently published in the Canadian Journal of Fisheries & Aquatic Sciences; is that right?
A. Yes, that's right.
Q. But that paper itself is not the actual model; right?
A. I don't understand that.
Q. Is it -- does the paper present a discussion of the model?
A. Oh, yes.
Q. But the model itself is a computer program, an equation, it's not in -- it's not the paper itself is the model?
A. Well, the model has all the mathematical equations listed in the publication. And so it's got all the details. The computer code itself, no, that's not in the paper. The

computer code is not there, no.
Q. So does the paper, then, report the results that you obtained when you ran certain variables, inputs through the model?
A. Yes, it does.
Q. And in that paper, talking about the published paper, you did not, in fact, examine the effects of fall X2 on delta smelt abundance; did you?
A. No, not in that paper.
Q. And instead, that conclusion appears in an appendix to the declaration that you filed this June; is that right?
A. Yes.
Q. And I believe that's been admitted into evidence as Plaintiffs' Exhibit 3, which you probably still have up there. So I'd like to refer you to that.
A. I have Exhibit 3 in front of me.
Q. And is the conclusion that fall X2 does not affect delta smelt abundance, it's there, reported in Exhibit B?
A. Yeah, that's where it is.
Q. Okay. And Exhibit B is only three pages; is it not?
A. Yes.
Q. Could you please read to me on page 1, the date that Exhibit B was created?
A. It says October 2010.
Q. Thank you. Is Plaintiffs' Exhibit 8 up there in your

binder, doctor? And this would be the version of your published paper as it appears in the journal.

A. Yes, I have it.

Q. Okay. You've got that there. Could you take a look for me at the first page, down at the bottom, there's a little box or kind of a black line thing.

A. Yes.

Q. And under that, does it say that the manuscript was received by the journal on April 11th, 2011?

A. Yes.

Q. And does it say that the manuscript was accepted for publication on April 28th, 2011?

A. Yes.

Q. So I believe you just testified that the analysis in Exhibit B, you completed in October 2010.

A. Yes.

Q. Yet you did not submit that as part of your submission to the journal.

A. No.

Q. Has the analysis in Attachment B ever been published, doctor?

A. Oh, that little report? No.

Q. No. Has it been formally peer reviewed?

A. Peer reviewed? No.

Q. In your declarations, you've offered a critique of Action

4 component 3 of the RPA; is that right?
A. Yes.
Q. Will you tell us in what months of the year Action 4 is implemented?
A. Well, September and October. You mean RPA 3?
Q. RPA component 3, which is sometimes referred to as Action 4. But for the sake of simplicity, I think we're all talking about it as the fall X2 action.
A. Yeah. Okay. Well, certainly September and October. Then there can be some other actions triggered by other things in November, which carry into December.
Q. Okay. And will you tell us in what water year types Action 4 is to be implemented?
A. Well, certainly in an above normal water year, like this year, it is -- it's to be implemented.
Q. And the method section of Attachment B to your declaration states that you examined two averaging periods for fall X2. October through December and September through December. Is that right?
A. Uh-huh.
Q. Is October through December the same time periods that Action 4 operates?
A. Actually, it would be -- include September.
Q. It's included there. So you examined a different, slightly perhaps different period than what's actually to be

implemented in the BiOp; is that right?
A. Yeah. Maybe. I -- it depends, you know. This action can go on through December. So it could go September through December.
Q. Do you happen to know if it -- if the agency's intent is for it to go into December of this year?
A. I don't know.
Q. Does your work in Attachment B examine the effects of X2 on delta smelt in specific water year types?
A. No.
Q. So in Attachment B, you examined X2 during all water year types?
A. Yes.
Q. And that set would be something different than what Action 4 is to be implemented during; is that right?
A. Yes.
Q. Have you included in your declarations, doctor, any analyses that examine the effects of X2 on delta smelt using the same months and water year types prescribed by Action 4?
A. No.
Q. And you used data on X2 in that Attachment B from the period 1972 to 2006; is that right?
A. That's correct.
Q. Doctor, do you know how many years, during that 35-year period, the water years were wet or above normal?

A. Not off the top of my head, no.
Q. Doctor, are you familiar -- I believe you testified earlier this morning that you were familiar with a fish survey called the summer townet survey; is that right?
A. Yes.
Q. And that survey is conducted by the California State Department of Fish & Game; is that right?
A. Yes.
Q. And that data set goes back more than 50 years; is that right?
A. It goes back a long ways.
Q. Okay. Well, let's take a look at exactly how long. I've got Defendants' Exhibit 507 here, just so we can be clear on this.

All right. I'm going to ask you to turn to what I think is the second page of that document. And I've got it up on the screen as well.

But first let me ask you: Is it your understanding that these data are publicly available?
A. Yes.
Q. Made available by the State of California?
A. Yes.
Q. But the -- let's -- I'm sorry.

Let's go back to my earlier question about the length of this data set. Do you see on the bottom axis there, where

it says "year"?
A. Yes.
Q. Is it your understanding there that over on the left-hand side, where it says "60," that refers to the year 1960?
A. Yes.
Q. But for the summer abundance variable in your life cycle model, doctor, you chose not to use the summer townet survey; is that right?
A. To not use it? Period? I did use it.
Q. To not use the summer townet survey. You do use the summer townet survey?
A. Yeah.
Q. Can you explain to us how you use that then.
A. The summer townet survey is one of the three survey indices that are used in the application of -- to delta smelt that appears in the recent publication.
Q. And that application that you're referring to, is that the work of Mr. B.J. Miller?
A. No, no, the application I'm talking about is the Maunder and Deriso, Canadian Journal of Fisheries & Aquatic Sciences life cycle model for delta smelt.
Q. The model itself?
A. Is -- well, in application to delta smelt that appears in the publication.
Q. So you've used as an input variable the summer townet

survey?
A. Yes.
Q. Have you also used a summer abundance variable created by Mr. B.J. Miller?
A. No.
Q. Nor one by Dr. Brian Manly?
A. By Dr. Manly, we used the indices in a report of his for the variance estimates associated with the summer townet survey. The townet survey itself is the same one that appears online by the Fish & Game.
Q. Does Dr. Manly's variable make use of the summer townet survey?
A. Yes.
Q. And what does it then do to the summer townet survey data?
A. Well, what -- the thing that we use from what Dr. Manly had done was an estimate of the variability in the survey. So he had this quantity that we call the variance estimates. And he produced variance estimates for each year of the summer townet survey from 1970 through 2006. So we use his variance estimates.
Q. Are you aware that Dr. Miller has also testified on behalf of the plaintiffs in this matter?
A. Yes.
Q. So given what you just described for us with respect to Dr. Manly's work with the summer abundance variable, would you

say that the variable is something other than the raw summer townet survey data?
A. No, he uses the raw summer townet data to construct his variance estimates.
Q. Okay. So the summer abundance variable that's used in your model is the raw summer townet survey data?
A. It's the -- it's the summer townet survey index which appears right on their website.
Q. Thank you, doctor.

Did Mr. Miller and Mr. Manly provide one of the input variables for delta smelt prey in your life cycle model?
A. Yes.
Q. And has that variable or the related materials, has that been published, to your knowledge?
A. I believe that their article that describes this data is in a paper that is in press. So it's been accepted for publication. But to my knowledge, you can't go online yet and get reprints of the article.
Q. Have you, yourself, reviewed the raw data that's been used by Dr. Manly and Mr. Miller in that -- in that article?
A. By "raw data," do you mean station-by-station or something?
Q. I suppose so.
A. No, I haven't looked at station by station.
Q. Let's take a look now at your reply declaration. We've

got it marked here as Exhibit 510.

I'm going to go ahead and put it up here on the screen while Mr. Williams is handing it out.

I thought this thing had a zoom function. Apparently it's not working, but I hope that's legible to everyone.

THE CLERK: You have to press it down hard.

MR. EDDY: Hard. So you do.

Q. Let's take a look at paragraph 20, if you would, please, sir.

A. Yes.

Q. In that paragraph -- well, first of all, let me ask you: Does this appear to be the declaration that you filed in this case?

A. Yes.

Q. And I think this has also been moved into evidence by the plaintiffs, but I --

MR. GONZALEZ: Yes, it was.

MR. EDDY: I don't have the exact number, but here it is.

THE COURT: Let's only have one number if it's both designated by plaintiff and defendant.

MR. GONZALEZ: It is Exhibit 5.

THE COURT: 5? Any objection to it going into evidence?

MR. GONZALEZ: Well, it's already in evidence.

THE COURT: It's already in.
MR. GONZALEZ: It's in evidence as Exhibit 5.
THE COURT: All right. So we'll refer to it as Exhibit 5.
MR. EDDY: Thank you, Your Honor.
Q. In that paragraph, doctor, you state that you relied on data sets developed by other scientists; is that right?
A. Yes.
Q. And you also state in that paragraph that you cannot account for every detail of every covariate provided by these other scientists; is that correct?
A. That's correct.
Q. And that includes the prey variable provided by Mr. B.J. Miller and Dr. Manly; does it not?
A. Yes.
Q. So you accepted this set of unpublished data without yourself looking at it or investigating the validity of the data set itself; is that right?
A. That's correct.
Q. Dr. Deriso, for the water temperature input variable in your life cycle model, that's actually an air temperature variable; isn't it?
A. For some years. The water temperature measurements began after they started with the 20 millimeter survey. So prior to that, they needed a proxy, so based on -- as I read the Miller

et al. paper, what they say in the Miller et al. paper is that they relied on the correlation between the water temperature and the air temperature from the years in which they had measurements to develop an estimation algorithm to apply to the earlier years.

Q. So based on your understanding of Mr. Miller's work, is there -- is it that air temperature data is used during years for which there is no water temperature data?

A. That's my understanding.

Q. And do you know what years those are?

A. Yeah, that would be prior to 1995.

Q. Okay. And have you, yourself, investigated whether it's true that there is no water temperature data publicly available for those years?

A. No.

Q. All right. Now let's -- I want to put that document back up on the screen, Plaintiffs' Exhibit 5, the reply declaration. And this is that same paragraph again. I'm interested in what's at the bottom of that paragraph. And that's paragraph 20. Are you with me?

A. Yeah.

Q. You say there that if someone were concerned, quote, "about the use of air temperature rather than water temperature, the covariate could easily be traded out for future analysis."

Have I read that correctly, doctor?
A. Yes.
Q. In preparing this reply declaration, did you make any effort to test that yourself?
A. No.
Q. Even though it could be done, in your own words there, easily?
A. Yes.
Q. In your declarations filed this summer, doctor, you critique the work of Mr. Frederick Feyrer; do you not?
A. Yes.
Q. Is your criticism of Mr. Feyrer's work limited to his 2011 published paper or does it also go to his 2007 published paper?
A. I had previously testified regarding his 2007 publication, so I didn't -- did not revisit material that has already been presented before the Court before. And limited myself to things after that.
Q. So in preparing this reply declaration, you did not examine the Feyrer 2007 study?
A. Oh, yes, I've examined it. In fact, I've testified about it.
Q. Okay. And I'm going to hand you -- this may already be in evidence. But what I've got here is the administrative record pagination of the Feyrer et al. 2007 study.

I'm being told that it's not yet in evidence. Since this is in the administrative record, we haven't given it an exhibit number. But I have a few copies here. We identified this on our exhibit list as part of the administrative record that we'd be talking about during this hearing. So I'll hand out a few copies here. I've got administrative record pages 18266 to 18277.

And I regret that I don't have copies for everyone sitting in this room since it's in the administrative record and is a key document, I didn't do that. I think we've already looked and talked about it a lot, but I'll provide you with one and anyone else who needs it.

Doctor, does this appear to be the paper that you've referred to in your opinions given in this case as the Feyrer et al. 2007 study?

A. Yes.

Q. Can you read to us on that page --

THE COURT: Well, let's -- before we read it, let's get it marked and received in evidence.

MR. EDDY: Okay. I'm happy to assign it an exhibit number. We haven't done that yet, but we'll just give it one on the end of our list here. Let's give this Defendants 586, please, Your Honor.

THE COURT: All right. It will be marked Defendant's 586 for identification.

(Federal Defendants' Exhibit 586 was marked for identification.)

BY MR. EDDY:

Q. Can you read to us, doctor -- I'm sorry. Just one second.

Can you read to us, doctor, on that page the name of the journal in which this paper was published?

A. Yes. That is the Canadian Journal of Fisheries & Aquatic Sciences.

Q. This is the same journal that recently published your life cycle model; is it not?

A. Yes.

Q. All right. I'm going to point you now to, in your reply declaration, the very last sentence, please, sir. This is going back to Plaintiffs' Exhibit 5 briefly. It's page 12.

Just one second.

THE COURT: There doesn't appear to be internal pagination, so you'll have to refer to the -- it starts with -- it looks like 723 in the upper right-hand corner.

MR. EDDY: I want to make sure that we're -- oh, yes, that's the Feyrer et al. study, Your Honor. And there are two paginations that you see there. The one on the top is the administrative record page number.

THE COURT: All right.

MR. EDDY: The one below it is the journal pagination there.

Q. And turning back to your reply declaration just briefly, Dr. Deriso, that last sentence there states, does it not,

"The real choice here is between the standard scientific process, in which hypotheses are rigorously tested and invalidated if they are unsupported by the evidence, and no science at all."

Is that right?

A. That's correct.

Q. And that sentence comes at the back end of the critique of the work of Mr. Feyrer; does it not?

A. Yes.

Q. Is it possible that the editors of the Canadian Journal of Fisheries & Aquatic Sciences would accept for publication something that is, in your words there on that page, no science at all?

A. No.

Q. Then would you like to clarify that statement on page 12 of your reply declaration that characterizes Mr. Feyrer's work as no science at all?

A. This was with regards to the more recent publications. They're listed in here. We're talking about -- in paragraph 28, we're talking about the MacNally et al. publication 2010, the Thomson et al. 2010, the Kimmerer 2009, as well as the work listed on my life cycle model. And it's all overwhelmingly evidence that X2 does not have an effect.

Now --
Q. So --
A. -- the choice between this and those types is all because these are life cycle models. These are the only ones. There is no life cycle model in 2007.
Q. Doctor, my question pertains to your characterization of Mr. Feyrer's work as no science at all. And you testified that the Canadian Journal of Fisheries & Aquatic Sciences, which accepted for publication this 2007 paper, would not publish something that was no science at all.
A. Yes.
Q. So I think I'm still missing an answer to my question about -- or rather, I offered you an opportunity to clarify what you meant by "no science at all."
A. That's what I tried to do. By that, I'm referring to life cycle models. Okay? "There's no science at all" means if you discard the MacNally et al., the Thomson et al., and my life cycle, the one that Maunder and I did, then you're basically throwing out all the life cycle models. There is no life cycle model in the Feyrer papers. None of them.
Q. So it --
A. Except for the -- the 2008 manuscript had one in there, but then they took it out.
Q. So it's your opinion, doctor, that anything short of a life cycle model is no science at all?

A. It -- with regards to effect of this X2 on the population growth rate, yes.

Q. Thank you, doctor. One last question: In your life cycle model, did you use the raw published Department of Fish & Game abundance index values?

A. Yes.

MR. EDDY: Thank you. Nothing further from me, Your Honor.

THE COURT: Ms. Poole.

MS. POOLE: Thank you, Your Honor.

THE COURT: You may proceed.

CROSS-EXAMINATION

BY MS. POOLE:

Q. Good morning, Dr. Deriso.

A. Good morning.

Q. My name is Kate Poole, I'm an attorney for the defendant intervenors in this proceeding.

Now, I'd like to talk some more about your life cycle model, which has been attached as Exhibit A to Plaintiffs' 3. That's your June declaration in this case; is that right?

A. Yes.

Q. Now, I've put the title of that paper up on the Elmo. Do you see that?

A. I'm missing the title. I've got the authors' names.

Q. Oops, you're right. I didn't center it well. There you

go.
A. Yes, that's the title.
Q. Now, as this title indicates, this model you've developed is a generic life cycle methodology that you've merely illustrated in the paper by application to delta smelt; is that right?
A. That's what the title says.
Q. And is that how you view your model in this paper?
A. The model in the paper is fairly customized to a life history of delta smelt.
Q. Well, the meat of your model, as it's described in this paper, is described beginning at page 6; is that right? Or if you look at the top. I think that the version they've submitted is not paginated. If you look at the top, it says page 7 of 48 of Document 922-1.
A. Which -- which exhibit is this?
Q. This is Plaintiffs' 3.
A. 3. Got it. Plaintiffs' 3. Which pages?
Q. Document 922-1, which is your paper.
A. I got it.
Q. Beginning at the top, it says "Page 7 of 48."
A. 7. Okay. The abstract. Okay.
Q. Yeah. And you see there, the -- it says, "Model," beginning at the top of that page; right?
A. Yes.

Q. And then the description of your model continues through page -- up to the top of page 18 of 48, where there's a new heading called "impact analysis." Right?
A. It looks like it's all through -- I think you've got the right pages.
Q. And where in that description of the model is there any discussion of delta smelt or delta smelt biology?
A. Not in that section, no.
Q. So the model itself is not -- is more generic, it's not actually designed for delta smelt?
A. It could be used for other species that share a life history like delta smelt. But it is set up, as it shows in the equations -- and if you look at these equations, you can see that it's tailored to an annual species and it's tailored to an annual species in which you have measurements at multiple times of the year.

So it's not a generic -- it wouldn't work for striped bass, for example, in its current form. We'd have to modify it if we wanted to apply it to something like striped bass. I couldn't use it for tuna. I'd have to modify it if I wanted to use it because it doesn't handle age structure. It's -- right now it's just it's an annual species and that's the way the equations are described.
Q. So the only characteristics of the model that are specific to delta smelt biology are related to the fact that it's for

an annual species with various abundance measurements during the year.
A. Yes.
Q. Thank you. Does your model test specific management actions for smelt?
A. No. I mean, they're not in the publication.
Q. Now, let's turn to what's been marked page 19 of 48 of that same document, your manuscript. Do you have that?
A. Yes.
Q. Okay. I've put it up here too. Now, if you could please read me the two lines beginning on page -- on line 393.
A. "These factors are used for illustrative purposes only and they may differ in a more rigorous investigation of the factors influencing delta smelt."
Q. Thank you. And when you make that statement that these factors are for illustrative purposes only and may differ in a more rigorous investigation, that indicates that there may be more appropriate input values for delta smelt than the ones you've chosen; correct?
A. May be.
Q. And if you used different input factors for your model, the output or the result would change; right?
A. They could.
Q. All right. Let's look at the input data that you used. If you could turn, again, in Plaintiffs' 3 to the next

section, which is titled at the top Document 922-2. These are your supplementary materials. And page 25 of 49 is what I'd like you to look at.

A. Oh, 1972. That's off.

Q. Do you see that?

A. Yeah.

Q. Now, if you turn to the end of that table, the fall midwater trawl data that you've used, actually all of the abundance indices --

A. Uh-huh.

Q. -- end at 2006; is that right?

A. Yes.

Q. And fall midwater trawl data is available through 2010; correct?

A. Yes.

Q. And do the more recent years, like 2007 through 2010, reflect historical lows in the fall midwater trawl abundance?

A. Yes.

Q. Why didn't you use that more recent data in your analysis?

A. These are the only years for which Manly provides the variance estimates. So it -- as you can see -- well, I've got them listed as standard errors there. "SE." So the standard errors are only produced for 2006.

The environmental covariates, which begin in the next table in S2, only go through 2006. So we just use the data

that they had -- that Manly had in his report.
Q. Did you ask Manly and his associates to provide the data through 2010?
A. No.
Q. And by using data only through 2006, you've excluded almost half of the Pelagic Organism Decline years; right?
A. Depends on what you define as the starting date. But if we take 2001 or thereabouts, maybe 2002, to be the starting date of the Pelagic Organism Decline, then yes, that would be about half of the decline.
Q. And does the lack of data during those years affect how well your model might reflect the current condition of delta smelt since the Pelagic Organism Decline?
A. I haven't done the application to know the answer.
Q. Thank you. Now, let's look at some of the input variables that you've used. Now, that summer townet data provided by the Department of Fish & Game has previously been provided to this Court by the federal defendants and I've put up on the Elmo a version of that.

Now, if you look at the year 1972, for example, you see the summer townet survey number is 11.1; correct?
A. Yes.
Q. And now, if we look at the value you've used on page 25 of 49 in document 922-2, you have a summer townet value in 1972 of 20,005; is that right?

A. Yeah.
Q. And now, in 1973, Department of Fish & Game reports a summer townet value of 21.3. Almost double. And you've used a summer townet value of 11,185, or almost half of the '72 value; is that right?
A. Yeah.
Q. And why are the numbers you've used so vastly different from those reported by Fish & Game?
A. We used the ones that are in the Manly report and that are now in the paper that's in press. And my recollection is that Manly went through and did some regional weighting volumes of water and some other things that he did to it that -- but it was all started with the same raw data that this STN index started with.
Q. Are you aware whether the data used in the delta smelt life cycle models prepared by Thomson and MacNally are publicly available?
A. Yes.
Q. Those data sets are publicly available?
A. Yes.
Q. But you chose not to use those?
A. No.
Q. Why did you make that choice?
A. I thought that the data that was in the Manly report was a sensible data set to illustrate the application of this

particular assessment model.
Q. Do you know whether Dr. Manly and his associates deleted data from the publicly available data set?
A. I wouldn't know the answer, no.
Q. Well, one of the reports that you cite in your life cycle model is this Nations report. This is one of Dr. Manly's associates; right?
A. Yes.
Q. And does this look like the Nations 2007 document that you cite in your paper?
A. Yes.
Q. Now, if you look down here at his -- at this highlighted sentence, does it state that they have deleted several observations from the 20 millimeter survey data?
A. Yes.
Q. And does it also say that they removed certain stations that had been infrequently sampled?
A. Yes.
Q. Thank you. And the published version of your model doesn't include this underlying data provided by Mr. Manly and his associates; does it?
A. The raw station by station? No.
Q. I mean the data that they provided you.
A. The data that's listed in the supplementary material is data that was in the Manly report.

Q. Right. But how they derived that data, I suppose, I should --
A. No, the derivation, they would have to go to the Miller et al. paper that's in press.
Q. Okay. And the supplementary materials that you provided in document 922-2, is that part of your published manuscript?
A. Yes. The Canadian Journal does things so that you have online, and also in the journal, the main body of paper. But then there's extra supplementary material which appears on their website.

And so if you go to that web link that's listed there for my online version, you can see that there's a link there for the supplementary material, which is also on the web. So it is published, but only on the internet.

Q. Thank you. Now, let's look at the entrainment data that you used in your model. How did you define "entrainment" as you've used it here?
A. Entrainment is the mortality rate that occurs from entrainment.
Q. Is that equivalent to the salvage numbers reported by the projects?
A. No, it's not.
Q. And the entrainment data is -- that you've relied on is also that provided by Manly and his associates?
A. No, it's not.

Q. What is it?

A. As explained in the publication, what we did is we used the Kimmerer 2008 publication. He has published estimates of entrainment for both the juveniles and the adults. He does these entrainment estimates only for a period of time, like for the juveniles, it only goes back to 1995. And the adults, I don't know, maybe it's to '95. I can't quite recall the starting date for the adults.

And so we took Kimmerer's entrainment estimates for the adults and juveniles and used them in the years for which Kimmerer provided estimates.

For years prior to those provided by Kimmerer, one thing that I did, two separate pieces on analysis. One is I followed the approach that was done in the BiOp. They found that a multiple linear regression using spring OMR flow and spring X2 were good predictors of his juvenile entrainment estimates. So I used those -- that regression equation to fill in juvenile entrainment estimates for years prior to 1995.

For the adult entrainment, what I saw when I displayed it graphically is that his adult entrainment estimates portray pretty much what we had called a hockey stick model, if you will, in my previous testimony. That is, that the entrainment rate for adults is not related to OMR flows until you get to sufficiently negative numbers. In

Kimmerer's work, the number was minus 5,000 something.

But anyway, I did a piece wise linear model using the winter average OMR flow to his adult entrainment rates. It's got a very good fit. And I used that regression equation then to fill in for the missing data prior to the years in which Kimmerer provided estimates.

Q. So you are testifying that you did that yourself. You did not rely on Manly and his associates entrainment variables.

A. That's correct.

Q. And did I understand you correctly that you took Kimmerer's estimates directly, without manipulation, for the years 1995 onward? Or did you manipulate that data?

A. No, I didn't manipulate them.

Q. Thank you.

A. I mean, there is a transformation of the covariates done for the application. But they can be untransformed to get back to the original estimates. So it gets fairly technical. If you want to go there, we can.

Q. My question, I think, is fairly simple. Did you take Kimmerer's estimates of entrainment from 1995 onward --

A. Yes.

Q. -- directly from his paper and use them as input variables?

A. Yes.

Q. You did not modify them before you input them into your

model?
A. I did transform them when I input them into the model, to get them into a form which is consistent with the mathematical framework that I was working with. But I didn't -- I didn't change them, other than to do a transformation to them.
Q. Okay. Now, in your life cycle model report, you state that "Manly 2010b provided several variables as candidates to account for the changes in delta smelt abundance from fall to summer and summer to fall." And then you go on to state that "The factors proposed by Manly 2010b are those that are considered to act directly on delta smelt."
Now, who exactly is it that considers those factors to act directly on delta smelt?
A. Doctors Miller, Manly and Fullerton and whoever else is on that publication.
Q. And are Doctors Manly, Miller or Fullerton delta smelt biologists?
A. Yes.
Q. They are?
A. Manly is a statistician. Dr. Miller, I don't know, I -- maybe he's more of an engineer. Dr. Fullerton, he's more of a biologist.
Q. Would it surprise you to learn that Mr. Miller and Mr. Fullerton are both engineers?
A. No. I didn't know that.

Q. Now, I'd like to ask if my colleague may approach and distribute what's been marked as Federal Defendants' 544.

You have that before you, Dr. Deriso?

A. Yes.

Q. And does this look familiar?

A. Vaguely.

Q. This is, in fact, a copy of your declaration filed in this case on February 18th; is that right?

A. Yes.

Q. Now, if we -- well, let's back up for a second.

If we look at Attachment A to this document, which begins on page 34, is that the Miller and Manly paper that you're referring to as "in press"?

A. It looks like an earlier draft version that has a lot of the same stuff. It obviously has gone through -- well, I don't know, these might actually be exactly like it. It looks very similar to it. It doesn't have the -- it doesn't have the data tables, though, that the publication has.

Q. But you haven't provided any more recent version of this paper to the Court; have you?

A. No, I think -- I don't think it was attached to anything that I can recall. Maybe someone else can recall it, but I surely -- I can't recall whether it was attached to anything or not.

Q. Well, let's assume not for now. And if you go back and

check, you can modify your answer.
A. Yeah.
Q. Could you turn to page 47 of this document, please.
A. Okay.
Q. So this page describes factors with indirect effect on delta smelt, according to Miller and Manly and his associates; right?
A. That's the title.
Q. And if you look down at the second bullet, X2 is listed there; correct?
A. Yes.
Q. So these authors have determined from the start that X2 is not a variable with direct effect on delta smelt; is that right?
A. That's what it looks like.
Q. And the covariates that you've used in your paper are those that are considered to act directly on delta smelt; right?
A. Yes.
Q. So you didn't include any of these --
A. No.
Q. -- indirect factors?
A. I don't think so.
Q. Thank you. Now, you previously testified that you were familiar with the peer review of the biological opinion

prepared pursuant to the Information Quality Act.

Do you recall that that independent peer review found that the panel strongly concurs with the USFWS's use of X2 as an index for identifying delta smelt abiotic habitat?

A. I don't recall that.

Q. Do you recall that the peer review panel found that the X2 index is extremely well supported and scientifically valid and that few ecological indices are as robust and well studied as X2?

A. I don't recall.

Q. And do you agree with the peer reviewer's conclusion that it supports the assertion that hydrologic events and actions that alter the X2 location directly impact suitable delta smelt abiotic habitat?

A. No.

Q. And the choice of inputs for your model assumes from the start that X2 does not have a direct impact on smelt; right?

A. We used the factors that were in the Manly report on direct effect. Used the whole set of them. And it did not include X2.

Q. Thank you. And are you familiar with the State Water Resources Control Board report completed in August 2010 in which the State Board concluded that flows were an important factor acting directly on delta smelt abundance?

A. No.

Q. Let me just read you one excerpt of that report and you can tell me whether you agree or disagree with it.

Quote, "The weight of the circumstantial evidence summarized above strongly suggests flow stabilization harms native species and encourages non-native species, possibly in synergy with other stressors, such as nutrient loading, contaminants and food limitation," end quote.

Would you agree with that assessment?

A. I didn't really see the -- is that a complete sentence? It sounded like you stopped halfway through the sentence.

Q. Would you like me to read it again?

A. Yeah, because I didn't get where the verb was and the --

Q. Okay. "The weight of the circumstantial evidence summarized above strongly suggests flow stabilization harms native species and encourages non-native species, possibly in synergy with other stressors, such as nutrient loading, contaminants and food limitation."

A. I -- I don't have an opinion on that, on that statement.

Q. Okay. And your life cycle model does not consider salinity as a factor directly acting on delta smelt; does it?

A. Well, you saw the X2 analysis.

Q. I'm talking about your life cycle model, not your subsequent analysis.

A. Life cycle model was used to test X2, so, I mean, it was one of the covariates that we subsequently tested after -- outside of the publication.
Q. Right. Okay. But let's -- all right. Let's separate out. The model that you've published does not include salinity as a variable that acts directly on delta smelt; correct?
A. Maybe it's just a little confusing. The model is a mathematical framework for a life cycle model. It can accommodate multiple environmental factors, including X2. It's just a matter of whether or not you put that in the environmental data set in the application that you're doing with this model.

So no model contains the environmental data. They are added to or applied to the model.
Q. Let's -- let's look at Table S2, which is the supplemental material associated with your model. This identifies the covariates that you've tested in your model, is that right?
A. That was in the -- in the publication, those were the ones that were examined, yes.
Q. And none of these covariates is a salinity factor; is that right?
A. That's correct.
Q. Thank you. And now, are you aware of the published paper by Sommer et al. in 2010 that found that the distribution of

delta smelt was strongly associated with the position of fall X2 in the estuary?

A. No.

Q. Now, let's look at the prey density inputs that you used. Is it your understanding that one of the purposes of the fall X2 action is to modify the spatial distribution of delta smelt so that the population has access to highly productive regions of the estuary where food is more abundant?

A. I don't believe I've seen those words. But that's sort of the general impression I get.

Q. That is the general impression you get?

A. It's to modify the habitat. I don't -- I don't recall anyone writing about the food.

Q. Well, let me represent to you that that is one of the purposes, and it's, in fact, been described in the federal defendants' declarations here.

Now, do you know where those regions of the estuary that are highly productive, where food would be more abundant, are?

A. If -- I know it varies. And I don't know particularly where the regions are right now. I mean, there is variability in where the prey has been available.

Q. Do you know, generally, over the course of history where productive regions of the estuary, in terms of food sources for delta smelt, tend to be in the fall?

A. No.
Q. Now, the peer reviewers of this year's proposed fall X2 action have explained that, quote, "Native and non-native zooplankton abundices are known to be enhanced in the western portion of the Delta during the fall. These zooplankton populations likely contribute to the predicted enhancement of the health and condition of delta smelt in this zone." End quote.
Do you agree with that statement?
A. I don't know.
Q. Meaning you have no basis to judge it?
A. I haven't seen the data.
Q. And the prey density inputs that you've used in your model don't actually consider prey density in the fall; do they?
A. No, there were -- there was not a prey -- in the Manly report, I don't think they had a prey variable for the fall.
Q. In fact, those prey variables only go to August at the latest; is that right?
A. Yes. That's my recollection as well.
Q. And in fact, if you turn to page 41 of what's been marked Federal Defendants' 544. This is the Miller and Manly report. Let's make sure I can find this.
Yeah, if you look at line 1 there, they explain that "having no reports of food limitation in September to December or January to March, we did not choose those factors for the

initial analyses."

Do you see that?

A. No, I don't. Which page are you on?

Q. I'm on what's marked at the top as page 41 of 51.

A. 41. Okay. And --

Q. And if you actually turn back a couple of pages, actually turn back to page 36, you'll see that they're talking about prey density.

A. There's prey density. I found that.

Q. Uh-huh. And then that paragraph concludes with the sentence that begins on line 1 of page 41.

A. Oh, yes. I see that.

Q. Would you expect that your model would find food limitations for smelt in the fall when your inputs explicitly assumed that there were no food limitations in the fall?

A. I just used that data set that was in the Manly report.

Q. Okay. I understand that. But that's not my question.

Would you expect that your model would find food limitations for smelt in the fall when your inputs explicitly assumed that there were no food limits in the fall?

A. The model is quite capable of testing the variety of environmental factors. When I've given presentations to other groups about this life cycle model, those groups, for example, that are associated with the BDCP process and biologists, you know, from the California agencies, I've emphasized that we're

certainly open to taking a set of environmental factors that someone wants to -- us to apply and apply it to that set of environmental factors. If someone constructs a set of prey density variables in the fall, I'll be more than happy to apply that to the model and see whether or not the covariates are important factors.

Q. I appreciate that, Dr. Deriso, but for purposes of sitting here today, you haven't actually done that analysis?

A. No, I haven't done that analysis.

Q. And so, having not done that analysis, your model didn't test the statistical influence of prey density limits in the fall; is that right?

A. No, it hasn't.

Q. Thank you. Do you understand another one of the purposes of fall X2 is to help rearing smelt avoid predation by allowing them to access more turbid waters?

A. I understand turbidity is important. I don't know if what you're talking about is one of the functions of their action.

Q. Let me represent to you -- excuse me -- that one of the federal defendants' declarations in this case does explain that fall X2 is designed to help rearing smelt avoid predation by allowing them to access the more turbid waters downstream.

And the agency plan for implementing this year's fall X2 states that "Turbidity at X2 is higher when X2 overlaps Suisun Bay than when it's in the river channels east of the

Sacramento San Joaquin confluence."

Do you agree with that assessment?

A. I -- I have no opinion.

Q. And that plan also states that "higher turbidity is expected to reduce predation rates on delta smelt." Would you agree with that?

A. Certainly I found myself -- in fact, I think the declaration that you had from February for me, certainly original one, showed that turbidity was a very important factor in predicting the salvage rate of adult delta smelt. So, yeah, turbidity is important.

Q. Thank you. And your model did test the effect of predation in the fall, between September and December; correct?

A. Yeah, there is a predation index there.

Q. And you found that predation is a significant factor in smelt abundance?

A. Yes, that was one of the factors. It has to -- to elaborate just a little bit. It's not just a pure predation index, it's predation times Secchi depth or water transparency, related to turbidity. Again, the theory being that the predation risk is higher when the water is -- has higher clarity. So that's why it's treated as an interaction term when it's input into the analysis.

Q. Okay. Well, let's look at your June -- I believe it's

your June declaration. Yes. Plaintiffs' Exhibit 3. Document 922-3, which is your fall X2 analysis.

Do you have that?

A. Yes.

Q. Now, did this fall X2 analysis account for the fact that the fall X2 action would allow smelt to access more turbid waters?

A. That would be an implication if, in fact, turbidity was related to the X2 location, then by testing the X2 factor itself, you're testing all the implications of that as well, including if it has an effect on turbidity and, therefore, on predation.

Q. And you've just testified that Secchi depth is the factor that measures turbidity; is that right?

A. It can be used to measure turbidity.

Q. But if you look at the list of factors that you've used in your fall X2 analysis, on page 2 of document 922-3, there's no Secchi depth factor in there; is there?

A. Not in this document, no.

Q. So you didn't include that in your fall X2 analysis?

A. No.

Q. Your model finds strong evidence for density dependence in survival from juveniles to adults; correct?

A. Correct.

MS. POOLE: Your Honor, I'm about to launch into a

new area here. Would this be a good time to break for lunch?

THE COURT: Yes. Let's take the noon recess. We will stand in recess until 1:30 p.m.

MS. POOLE: Thank you.

(Lunch Recess.)

THE COURT: We're going back on the record in the consolidated delta smelt cases.

Ms. Poole, you may resume cross-examination of Dr. Deriso.

MS. POOLE: Thank you, Your Honor.

Q. Good afternoon, Dr. Deriso.

A. Good afternoon.

Q. Before we broke for lunch, I started to get into density dependence with you. And do you recall I asked whether your model finds strong evidence for density dependence in survival from juveniles to adults?

A. Yes.

Q. And let's look at the basis of that finding. In Plaintiffs' 3, if you could turn to page 18 of 49 of document -- document number 922-2.

I have it up on the Elmo, too, if that helps you.

A. 49, you say?

Q. Page 18 of 49.

A. Oh, 18 of 49.

Q. Across the top.

A. Okay. Yes, I have it.
Q. Now, this middle figure on this page marked as (b) shows the juvenile density dependence; correct?
A. I've got the wrong document.
Q. This is from your model --
A. I see. 14 of -- 18 -- yes, I have it now.
Q. And that middle figure marked as (b), does that show the juvenile density dependence relationship?
A. Yes, it does.
Q. That relationship essentially being driven by these three data points in the lower right; correct?
A. There are four Xs near where you pointed. And then there's two more Xs on the descending limb just slightly above one. So I would count six Xs on the descending limb there.
Q. Perhaps you could tell us the difference between the circles and the Xs on this figure?
A. The points are the model estimates of abundance, the lines are the estimates from the stock recruitment models without the covariates or process variation. The crosses are estimates without the covariates.
Q. So is it the circles or the Xs that you're looking at to determine the density dependence relationship?
A. The model is using the Xs and it's fitting. Because the -- the differences between the Xs and the circles is the estimated process variability. So accounting for the process

variability by looking at the Xs, you get more of what the underlying relationship is.

Q. And the circles represent more of the actual data?

A. Yeah, that's just the raw data.

Q. Well, let's focus on the circles. Now, it looks to me like there are essentially three circles that are really bringing the line down and to the right, is that correct?

A. No, the line is being fit to the Xs.

Q. Okay. Then let's look at those four Xs in that same area here. Those four seem to be driving the slope of the line in that lower right hand area; is that right?

A. No. The additional two Xs up there of a juvenile abundance of around 1,000 are also sitting smack on the line. On the declining limb of the line.

Q. Okay. Let's ignore these four Xs. Okay? Then the slope of the line could go up in this direction and be centered among those Xs; is that right? The remaining Xs.

A. I don't know.

Q. Can you take a guess?

MR. GONZALEZ: Well, Your Honor, I would -- I've been trying not to object, but I don't want any guessing. I don't know if that's helpful.

THE COURT: Give us your best estimate, please.

THE WITNESS: My best estimate is that there is not a clear declining limb to it. It might be that a Beverton-Holt

stock recruitment model might provide a better fit. That's one in which it goes into an asymptote and so there is no relationship between the juveniles and the subsequent adults once you get past a certain density level.

BY MS. POOLE:

Q. And is that also known as density independent?

A. No, that would be a density dependent relationship as well.

Q. Thank you. Now, looking back at the circles, those three data points. The text of your paper states that those three data points in the lower right are from 1976 to 1978; right?

A. Yes.

Q. And your model also states that the density dependence in survival from juveniles to adults found in our study was probably heavily influenced by those three consecutive years of data; is that right?

A. Yes.

Q. And those data are from starting 35 years ago; right?

A. That's correct.

Q. And do you think some conditions in the estuary and the delta smelt population have changed in the last 35 years to affect that relationship?

A. Not necessarily, no.

Q. Are you aware that the biological assessment prepared for the BiOp in this case, with the help of several of the

plaintiffs, found that summer to fall survival data since 2000, quote, "strongly suggests that recent population trends are outside the historical realm of variability and resilience shown by these species, particularly delta smelt"?

A. I don't recall that statement.

Q. Are you aware that delta smelt life history model prepared by Nobriga and Herbold concludes that delta smelt have not exhibited delta smelt dependence in the juvenile stage since 2001?

A. I've heard that.

Q. So you agree that the juvenile to adult stage of delta smelt is currently density independent?

A. Yes. Yes, it shows right on that figure that we were looking at.

Q. And was your model developed, quote, "to evaluate population impacts in the presence of density dependence," unquote?

A. Yes.

Q. And the assumptions you make about density dependence change the result of your model; correct?

A. The model results differ depending on which form of stock recruitment curve you use.

Q. If the delta smelt population is currently density independent, then losses at any life stage should translate proportionately to losses from the adult population; right?

A. Yes.
Q. So in other words, if we lose, hypothetically, ten percent of the juveniles to entrainment, a density independent adult population would be ten percent lower than it would be without those juvenile losses; right?
A. Yes.
Q. Now, let's look a little more closely at the conclusions of your paper. You state, on page 26 of this version of your manuscript, that "entrainment is estimated to have only a small impact on the adult abundance"; correct?
A. That's correct.
Q. But when you applied your life cycle model to delta smelt, the actual model results showed that juvenile entrainment have large impacts on delta smelt survival; right?
A. Depended on which of the models you're referring to.
Q. Well --
A. What do you mean by "large"?
Q. Let's look at the table that shows those results. Give me just a minute here so I can locate it.

Well, let's come back to that, I don't want to take up the Court's time.

On page 30 of your model, you state that the large modeled impact of the Delta entrainment -- or you look at the large modeled impact and state that, quote, "the coefficient for adult entrainment is also unrealistically large suggesting

that the model including water clarity and adult entrainment is unreliable." Right?
A. Yes.
Q. So is the model unreliable or is its large -- it's large predicted impact from adult entrainment accurate?
A. The statement is as you've just read. It's this large correlation that we're seeing with the two factors that we think is the reason why the coefficient on the adult entrainment was unrealistically large.
Q. So if you have determined that the modeled results for adult entrainment are unrealistically large, what methodology did you employ to determine that the effect of adult entrainment is small?
A. Yes. We had a comparison between that particular model fit that you're referring to and an alternative model that was within two Akaike units of that model. And therefore, it was a valid alternative model. The valid alternative model did not include entrainment in it. Or other factors. So it had a fewer number of covariates, yet explained about the same amount of variation as the one with the unrealistic entrainment coefficient.
Q. So the model you ultimately employed and that you're using to test fall X2 here just doesn't include entrainment?
A. That's correct. I believe that's the alternative model that was used.

Q. And state on page 31 that, following -- "naively following model selection without use of professional judgment is not recommended." Is that right?
A. Yes.
Q. And remind us, you're not a delta smelt biologist; correct?
A. That's correct.
Q. Is Dr. Maunder a delta smelt biologist?
A. No.
Q. And haven't you used a lot of professional judgment in your modeling exercise here, in your selection and manipulation of inputs, your assumptions regarding density dependence and your exclusion of certain results that don't meet your expectations?
A. No.
Q. How have you not exercised professional judgment in those three areas?
A. The environmental covariates was a complete set of the direct effect covariates that are presented in the Manly report.
Q. But you selected to use those data inputs rather than other publicly available ones?
A. Yes. And for -- to illustrate the application, as it says in the manuscript, that they have chosen to demonstrate the application.

Q. Let's just be clear then on the data selection point. That there were alternative data sets that were available, that were publicly available, that other life cycle models used for delta smelt used that you could have chosen to use?
A. Yes.
Q. Okay.
A. And as regards to the density dependence, that was actually a hypothesis of density dependence. It wasn't an assumption. It was a hypothesis that was comparisons that we did with models that did and did not include density dependence. And we went through a model selection process to choose the form of the stock recruitment relationship that was selected by the model selection process.
Q. Okay. But on page 29 of your model, you state, quote, "The type of density dependence assumed also impacted what factors were selected," end quote.

So there is some professional judgment in that decision; right?
A. The assumption is used in the sense there that we chose the one that had the most credibility from the hypothesis standpoint. And then we took that result and then we assumed that that was the correct result to use.
Q. Okay.
A. But it's a model selection process. I didn't assume it out of professional judgment, I assumed it because it was

selected by model selection process. Which is a statistical procedure.

Q. And when you've excluded adult entrainment, your model states that that is a decision that you made based on professional judgment; right?

A. It was based upon the fact that the alternative models were within two Akaike units of the more complicated model.

And I mentioned the reasons why I think some of the coefficients in a complicated model are unrealistic. And the simpler model, which is equally credible, doesn't have that problem.

Q. And so you used your professional judgment to choose between those two?

A. Results from both of them are shown in the paper.

Q. But you used your professional judgment to use the alternative model, as you've characterized it, to test fall X2?

A. Yes, that's correct.

Q. So of the factors you tested, which did not include flow, you've concluded that food abundance, temperature, predator abundance and density dependence are the most important factors controlling the population dynamics of smelt; right?

A. Yes.

Q. Now, let's turn to page -- or Table 7 of your model, which is on pages 12 to 13 of that document, 922-2.

A. And which page did you want?
Q. On pages 12 to 13.
A. Is this the document 2-2, this is the --
Q. This is your manuscript.
A. Yeah. The pagination that I have, if I'm using the pagination that's listed at the top, has a page 12 is -- is a listing of some coefficients.
Q. Well, the --
A. It's a Table 7? Table 7? Is that what you want me at?
Q. Yeah. Table 7.
A. Table 7. Okay. I got Table 7. Table 7 -- oh, I see, that's on actually page 13. Which you have there.
Q. Now, does this table mean that your model explains only 24 percent of the observed variation in delta smelt adult abundance?
A. Estimates of standard deviation of a processor error and the percentage of the process variation explained by the covariates for the lowest AIC model. So that would be what it would say that it can explain was 24 percent of the process, process variation.
Q. Okay. And the process variation is what you tested; right?
A. Yes.
Q. So it only explains -- the model only explains 24 percent of the variation in adult abundance?

A. Yes.
Q. Does that mean that 76 percent of the variation in delta smelt adult abundance is unexplained by the variables in your model?
A. Yes.
Q. And that has to be explained by some other factor or factors; right?
A. Yes.
Q. Now, does that 24 percent include variation explained by the adult entrainment variable?
A. I don't know. I don't have the comparison between the two.
Q. So you don't know if the model would explain less than 24 percent of the variation if the adult entrainment variable were removed?
A. No, I don't.
Q. And going back to Table 7. Does this indicate that the model only explains 43 percent of the observed variation in juvenile abundance?
A. Yes.
Q. And with regard to the larvae stage, is there an effective long-term program for monitoring the abundance of delta smelt larvae?
A. Larvae is used there in sort of a loose sense in that this is the index of abundance as measured by the 20 millimeter

survey.
Q. Which doesn't measure fish smaller than 20 millimeters; correct?
A. Well, it does measure fish smaller than 20 millimeters, just they're not as -- the gear selectivity is not 100 percent when you get down to the smaller sizes. But they do measure the smaller sizes as well.
Q. But many delta smelt larvae wouldn't be captured in the 20 millimeter --
A. No, like I say, this is used for the spring 20 millimeter survey, which covers the -- actually covers the early juvenile as well because the survey is taking place throughout the spring. It's just in a paper, when you get to distinguish between the summer townet survey, so we call that juveniles, whereas the 20 millimeter survey is also going to be sampling the younger juveniles as well.
Q. Okay. But can we just establish that the 20 millimeter survey done by the Department of Fish & Game does not effectively monitor delta smelt larvae?
A. They -- they -- they do. I mean, they estimate the abundance. Although how Kimmerer, in 2008, got his estimates of entrainment in the spring was by relying on the 20 millimeter survey. And so certainly he was interested in providing entrainment estimates for these smaller fish.
Q. Okay. But I'm trying to distinguish between the smaller

fish that we're talking about here. There's a difference between larvae and juveniles as you portray them here. Now, does the 20 millimeter survey, to your knowledge, effectively monitor for delta smelt larvae?

A. By "effectively," not as effectively as they measure larger juvenile fish because of the gear selectivity of the 20 millimeter.

Q. And can you give us any idea of the percentage of ineffectiveness?

A. There is -- I don't -- not off the top of my head. I believe that in their report -- oh, let's see, this would be the report by the -- by Manly's group when they were doing the bootstrap estimates to get the variance estimates on the 20 millimeter, they had a gear selectivity curve that was part of -- size selectivity curve that was part of the analysis. I can't recall the curve off the top of my head, but they do have gear selectivity curves that have been developed for the 20 millimeter.

I think Dr. Kimmerer had one as well that he utilized in his 2008 paper.

Q. Okay. Now, plaintiffs state in their brief supporting this motion that, quote, "The question of whether X2 affects smelt abundance has been answered definitively," unquote, by your model.

Do you agree that your model definitively answers

this question?
A. I'm -- it can certainly explain it.
Q. Do you believe it definitively answers the question?
A. Well, the word "definitively" is perhaps a little -- I mean, it's definite -- it definitely explains it. It definitely explains the claim.
Q. But you acknowledge that, quote, "our model is not the final word on the delta smelt, it can undoubtedly be improved," end quote. Right?
A. Yes.
Q. And you acknowledge that your model only explains less than 50 percent of the variation in both adult and juvenile delta smelt abundance; right?
A. Yes.
Q. And you've also stated that your model is merely, quote, a start towards answering the complicated question regarding the Delta," right?
A. Yes.
Q. And your model is essentially based on a series of statistical correlations; correct?
A. The model selection process doesn't use correlations per se, but it is definitely a statistically based decision.
Q. But you wouldn't call it a correlative -- series of correlative measures?
A. I would call it what it is, and that is that it's

maximizing likelihood of the -- of the data coming from this particular model. That's -- it's the standard way that you operate in statistics is statistically choosing the set of parameters that maximizes the chances that that particular set of data was driven by the dynamics of the model.

Q. So do you agree that the outputs of a life cycle model depends strongly on what its inputs are?

A. Yes.

Q. And a corollary of this principle is summarized in the phrase "garbage in and garbage out"; right?

A. Yes.

Q. Now, the peer reviewers on the fall X2 adaptive management approach for this year noted that the life cycle model being developed by Dr. Newman and others, quote, "is very strong scientifically and includes hydrodynamics modelers, ecologists and fish biologists with extensive experience in the Delta," end quote.

Was your life cycle model developed with fish biologists with extensive experience in the Delta?

A. Not per se.

Q. How about ecologists with extensive experience in the Delta?

A. We can apply ecology, but we're not ecologists per se.

Q. And even though the peer reviewers of this year's fall X2 action devote a section of their paper to life cycle models

and other modeling initiatives, they don't mention your model; do they?
A. I don't know, I haven't read that.
Q. Now, in your testimony, you've compared the validity of various models based on AIC scores; correct?
A. Yes.
Q. And you state that models that are ten or more AIC units above the best model have essentially no support; correct?
A. That's a quote, yes.
Q. And you've testified that the previous analysis that you presented to this Court comparing normalized salvage rates with OMR flow has an AIC score that's more than 400 points higher than your more recent models; right?
A. Where are you -- where are you quoting from?
Q. Well, let's see if we can find it.
A. Are you referring to the salvage rate paper? The turbidity one?
Q. I'm referring to the analysis -- if you turn to what's been marked Federal Defendants' Exhibit 544, Figure 1 presents -- do you have that?
A. I don't -- which exhibit is it?
Q. Federal Defendants' 544.
A. I don't --
Q. It's your February 18th declaration.
A. My February declaration. February declaration. Well,

that's through this morning. Yes, I have 544 now.
Q. And if you look at Figure 1 on page 4.
A. Figure 1 on page 4. Yes, I have that.
Q. So this is your previous analysis that you presented to the Court comparing OMR -- normalized OMR -- or normalized salvage rates with daily OMR; right?
A. Yes.
Q. And you testified that this model has an AIC score that's noted 400 points higher than your more recent life cycle model?
A. It's not referring to my more recent life cycle model. Where are you reading from?
Q. What is that referring to?
A. It was referring -- it appears that it's a model fit in this to doing a multiple linear regression, using turbidity and OMR flows to predict the salvage rates and found that this model is way better than the multiple regression fits. And 400 units sounds about the difference between the two.
Q. And by "this model," you mean your turbidity model that you presented in February?
A. Yeah, this is -- we're talking about the turbidity model now, on the daily salvage rates.
Q. And so given those AIC scores, you wouldn't recommend using your normalized salvage analysis anymore?
A. I wouldn't recommend the multiple regression. As I've

said, the results in Figure 1 are exceedingly better than the multiple linear regression using simply turbidity and Old Middle River flow.

Q. Which is what you had previously presented to this Court?

A. No. It's not been presented anywhere. It was done as part of the analysis on the daily -- on the daily salvage data.

Q. Okay. Now, you stated that your life cycle model has been peer reviewed; correct?

A. Yes.

Q. Did any of the peer reviews you received criticize your model?

A. There were some suggestions.

Q. What were those suggestions?

A. The peer review process is confidential. I'm required by Canadian Journal policy not to discuss the contents of the peer review or the correspondence with the editors.

Q. So even though you testified to this Court that your model is peer reviewed, you're not going to tell us what data you considered when you had -- underwent that peer review?

A. That would be violating the journal policy. It would be unethical for me to do that so I'm not going to.

Q. Well, Dr. Deriso, do you understand that the federal rules require a testifying expert to disclose the facts and data that they've considered in formulating their opinion?

A. You can talk it over with the Canadian Journal and see if you can get them to change their minds.
Q. The Canadian Journal is not testifying here, Dr. Deriso. You are.
A. I'm not going to do an unethical thing. I'm not going to violate journal policy.
MS. POOLE: Your Honor, in light of that, I'd move to strike any reference to Dr. Deriso's model as peer reviewed.
THE COURT: Mr. Gonzalez, any response?
MR. GONZALEZ: Well, Your Honor, I mean, it was peer reviewed. It's undisputed that it was.
THE COURT: Well, that's a conclusion of law. If his peer reviewed article is based on underlying data, assumptions, principles, whatever else is included, and we certainly have no quarrel. The Journal may have its policy, but without the underlying data, his opinion is subject to being stricken unless there is a legal reason not to do it. The motion to strike has to be granted.
MR. GONZALEZ: Your Honor, my understanding is that all of the underlying data is something that the witness is willing to testify about.
MS. POOLE: Well, the underlying data includes the peer reviews he's received.
MR. GONZALEZ: I'm not sure that it does or not. He hasn't been asked that question.

MS. POOLE: Well, it certainly does. Under Rule 26, it does.

MR. GONZALEZ: My point is, Your Honor, it hasn't been established yet whether there were any changes to his article at all at this point.

THE COURT: I don't think that's the pending question. And the underlying basis that provides the foundation for a peer review is something that apparently academically, or from the protocols of the Canadian Fisheries Journal, are not permitted to be disclosed.

And therefore, it's the witness' opinion that the work that's peer reviewed. If there is some other objective evidence of that, you may offer it. But I have to strike the current opinion because the foundation doesn't exist for it. The motion is granted.

MS. POOLE: Thank you, Your Honor.

Q. Did the Metropolitan Water District of Southern California pay you to develop your life cycle model?

A. Yes.

Q. And are you aware that Met and other plaintiffs have argued in this case that the Fish & Wildlife Service acted unreasonably because the agency allegedly ignored the concerns of their own peer reviewers?

A. I recall something like that.

Q. And do you recall previously testifying in this case that,

in your opinion, peer review is not important to validate scientific analysis?

A. I don't believe those are the exact words that I used.

Q. Well, let me repeat to you the colloquy that we had on April 6th, 2010 from the transcript.

My question: "And why is peer review considered important when developing scientific analyses?"

Your answer: "It's not."

Q. Do you recall that?

A. Yes.

Q. And do you recall testifying that you would not give any more weight to a peer reviewed study than you would to a non-peer reviewed study?

A. I don't know if that's the exact words that I said, I don't recall exact words. It was similar to what I believe. Peer review does not mean that it's a superior piece of work.

Q. Now, the request for the peer review of this year's fall X2 action asked what kind of action seems appropriate given the present array of available information.

Do you know whether the peer reviewers determined that the fall X2 action was not biologically beneficial?

A. No.

Q. Are you aware that they stated the -- the peer reviewers stated that 2011 provides an unusual opportunity for a quantum leap in our understanding of the link between delta smelt and

fall outflow?
A. No.
Q. Do you agree that the fall X2 action presents an unusual opportunity for a quantum leap in our understanding of the link between delta smelt and fall outflow?
A. I disagree.
Q. The peer reviewers went on to state that "Institutional failure to seize this ecological hydrological moment in time may handicap future efforts at large scale ecosystem restoration and experimentation."
Do you believe that any valuable scientific knowledge could be gained from implementing the fall X2 action this year?
A. No.
MS. POOLE: That's all I have, Your Honor. Thank you.
THE COURT: What's the basis for the last answer that you gave?
THE WITNESS: There's -- this fall X2 action is like some sort of grand experiment. And there's nothing in the scientific data from past years that's indicated that changes in X2 affect the population's growth rate. So I wouldn't expect a change in X2, whether it's induced, caused by a court action or due to natural causes is going to have an effect on the population's growth rate.

THE COURT: And then, obviously, you disagree with the other scientists who express the opinion that the implementation of the X2 experiment, if you want to use that term, or RPA, would provide beneficial information?

THE WITNESS: There's no evidence in the -- scientific evidence to place that hypothesis -- that supports a hypothesis. The available scientific data -- we have it going back for many years -- does not support the changes in X2 that are going to affect the population's growth rate. So I certainly wouldn't expect it to do it this year.

And a one-time experiment, if we're going to call it that, isn't very much data. When I do data analysis of population dynamics, longer time series are better. This paper that I can no longer refer to, I guess, as peer reviewed anyway, we were looking at from 1972 to 2006, so we had a nice long span of years to work with. I would not have tried to do something like that on a single year of data.

THE COURT: Thank you.

MS. POOLE: Thank you.

THE COURT: Any redirect?

MR. GONZALEZ: Just briefly, Your Honor. Hold on, Dr. Deriso.

THE WITNESS: Oh.

THE COURT: Not yet.

THE WITNESS: Excuse me.

MR. GONZALEZ: I just have a few quick questions.

REDIRECT EXAMINATION

BY MR. GONZALEZ:

Q. You were asked some questions about Mr. Feyrer's 2007 article. Do you recall that?

A. Yes.

Q. It was marked as Exhibit 586. Are you familiar with this article?

A. Yes.

Q. Is there anything in this article that, in your opinion, could support an argument that the delta smelt will be harmed if X2 is not implemented?

A. No.

Q. And there's also been some testimony about 74 kilometers. Is there anything in this article that, in your view, a reasonable scientist would be able to place X2 at based on what's in this article?

A. It's my opinion that it would not.

Q. All right. You were asked some questions about the data that you used. The X2 data that you used in your model. Where did you get that data?

A. That data is a data set that was provided to the 706 expert witnesses. And I believe it was provided by a federal agency, I believe, or it could have been a state agency.

Q. Doctor, if someone wanted to expand the habitat for the

delta smelt, would it be reasonable to look only at X2?
A. No.
Q. Why not?
A. Because there's a lot of biotic and abiotic factors that define the habitat of a fish species, including delta smelt. Certainly prey abundance. The abundance of predators. Maybe the turbidity. There's a lot of -- a lot of contaminants. The list just goes on.
Q. You were asked about the data that you used and whether or not there might be alternative data that you could have used.

Did MacNally and Thomson use the same exact data or different data than what you used?
A. Different data.
Q. And they reached the same conclusion, no connection between X2 and the decline of the delta smelt?
A. That's correct.
Q. And I want to ask you a couple of questions about a couple of new theories that were just advanced by the defendants.

First, is there any article that you are aware of, or publication, that suggests or states that X2 is going to lead to the delta smelt moving to where there's more food?
A. No.
Q. And they mentioned one other one. Is there any publication that you're aware of that studies and concludes that X2 is going to cause the delta smelt to move to more

turbid waters?
A. No.
MR. GONZALEZ: Thank you, doctor. That's all I have, Your Honor.
THE COURT: Anything further, Mr. Wilkinson?
MR. WILKINSON: No, Your Honor.
THE COURT: Mr. Eddy?
MR. EDDY: No, Your Honor.
THE COURT: Ms. Poole?
MS. POOLE: Not at this time, Your Honor. Thank you.
THE COURT: May this witness be excused?
MR. GONZALEZ: Yes, Your Honor.
THE COURT: Thank you, Dr. Deriso. You may step down. You are excused.
Call your next witness, please.
MR. GONZALEZ: Your Honor, we call Dr. Ken Burnham.

KENNETH PAUL BURNHAM,

called as a witness on behalf of the Metropolitan Plaintiffs, having been first duly sworn, testified as follows:
THE CLERK: Please have a seat. And when you do, state your full name and for the record and spell your last.
THE WITNESS: Kenneth Paul Burnham, spelling of the last name being B-U-R-N-H-A-M.
THE COURT: You may proceed.
MR. GONZALEZ: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. GONZALEZ:

Q. Dr. Burnham, first administrative matter. In the binder in front of you, can you confirm that Exhibits 2 and 4 are the two declarations that you have signed in connection with this proceeding dated June 16 and July 15, 2011.

A. 2 and 4. Yes.

MR. GONZALEZ: Your Honor, I move Exhibits 2 and 4 into evidence.

THE COURT: Any objection?

MR. EDDY: Just what we've objected to in the motion to strike, Your Honor.

THE COURT: Thank you. And your objections are preserved. Exhibits 2 and 4 are received in evidence.

(Metropolitan Plaintiffs' Exhibits 2 and 4 were received.)

BY MR. GONZALEZ:

Q. Dr. Burnham, you've been retained by the Metropolitan Water District of Southern California to express an opinion on whether an injunction in this case would harm the delta smelt; is that right?

A. Yes.

Q. Doctor, I'd like to start with some background. You're presently retired?

A. Yes.

Q. You retired after working more than 40 years for the federal government?
A. 36 and a half.
Q. All right. You retired in January of 2009?
A. Yes.
Q. And let's start, doctor, briefly, with your educational background. Would you please tell the Court where you went to school, when you graduated and what degree you received?
A. I assume we're talking college here. It was in the State of Oregon. My undergraduate work was at Portland State University. I completed there a bachelor of science in biology in spring of 1966.

And then went to Corvallis Oregon to Oregon State University for graduate study and received -- earned an MS in statistics in 1969 and completed a Ph.D. in mathematical statistics in February of 1972.
Q. All right. And doctor, with respect to your employment, after you received your Ph.D., did you begin working for the US Forest Service in Alaska?
A. Yes.
Q. And tell us briefly what you did there.
A. That was a research unit of the Forest Service at that time focusing on fire in interior Alaska and issues of what effect it had. For one thing, as to whether it was worth fighting or not given the cost, will it regenerate quickly or

not. So I -- we were involved in particular. I was only there for a year, and one study was Wickersham Dome Fire, looking at the regeneration, how fast do things regenerate.

Q. Doctor, in 1973, did you move to work in Maryland?

A. Yes.

Q. For the US Fish & Wildlife Service?

A. Yes.

Q. And tell us, just briefly, please, what you did there?

A. I was with the Migratory Bird & Habitat Research Unit, it was called, at the Patuxent Wildlife Research Center. We were focused on issues of population dynamics of migratory waterfowl in relation to their being hunted.

And most of the studying I was doing related to the use of banding these waterfowl are banded in very large numbers and the banding information, when you recover it from -- mostly from hunters, can tell you movements. But I was focused on the survival information in that.

So we have various species, males and females, young adult and what are the survival rates that we can infer from this capture, marked release recapture data on them. And that feeds now and then in to issues of regulations for the hunting of waterfowl.

Q. Did you use a quantitative model in that work?

A. Yes.

Q. And tell us very briefly what that is.

A. Oh. Well, you're figuring out how might these data have arisen if we imagine them as random variables. And that would be some sort of a probability model with particular structure on it, that then relates the information about survival and recruitment or capture probabilities or whatever to the -- what you can extract from the data. It's very similar to other sorts of models we've talked about here.

So it's linking the data to the population dynamics and the parameters in those, which are interpretable in terms of vital rates on these populations.

Q. And were the results of your rates used to manage hunting operations?

A. Yes. Indirectly. We were one step back from the management aspect of it, the hunting regulations being set. But the methodology applied to routine data collection was relevant to those issues of hunting regulations.

Q. In 1975, did you move to Colorado?

A. Yes.

Q. Still working for the US Fish & Wildlife Service?

A. Yes.

Q. What did you do in Colorado?

A. That was a new team they created called the Western Energy & Land Use Team. The goal of -- the intention of which was to, mostly by contracting, look at issues of impacts on wildlife in the west of energy development, which was ramping

up then.

So we got involved in a number of projects, trying to look in advance before a lot of development occurred, what might the impact be of oil field development, of more strip mining of oil, of drilling for gas and also the impacts then this would have about water. So it was terrestrial mostly, but some fish concerns.

Q. Did you develop models in connection with that work as well?

A. A little bit.

Q. Did your job involve determining how to best collect and interpret data?

A. Yes. Most of the stuff at that time was about designing studies and collecting data which would have some relevance to these issues.

Q. And then in 1983, you moved to North Carolina?

A. Yes.

Q. And you worked there for the USDA?

A. Yes, Agricultural Research Service. I was there for five years.

Q. And what did you do then?

A. At that -- in that position, I was in the role of a consulting statistician to the agricultural research scientists in some places in North Carolina, Virginia, South Carolina and Georgia.

Q. As of this point, had you worked with someone named David Anderson?
A. Yes. David was heading up the work at Patuxent when I went there. And so I was working -- I started working with him then in August of '73.
Q. And what work did you do with David Anderson?
A. Over this entire period of time, which is still collaborating. It's mostly focused on methodology for estimating the abundance of animals or methodology for looking at population dynamics issues. Survival rates, in other words, analyzing mark-recapture data, capture-recapture data, count data and -- which includes something we don't use anything in here of, which is distance sampling.
Q. When you say "animals," are you including fish?
A. Yes.
Q. And while you were in North Carolina working with David Anderson, did you work with him with respect to dams?
A. Yes. We got involved in a project, he got me involved on the mainstem Columbia on dams there. Outmigrating salmonids have to go past over, through these dams. To the extent they go through the turbines, there was an issue of what's the mortality. A lot of studies had been done on this at that time, some of these studies costing a million dollars and they were poorly designed, poorly set up. So we looked at issues of alternatives for designs, various designs.

And all of these are in the nature of capturing -- or releasing marked fish above turbines, below turbines, recapturing at subsequent dams. Looking at survival rate estimates. It was actually an experiment. So looking at estimating mortality through the turbines in particular.

Q. Were you looking to answer the question can we vary conditions to minimize mortality?

A. Yes. The experiments can be used that way.

Q. And through that work, did you approve data gathering and analysis methodology?

A. Yes. We took a very general look at this stuff. It's only applicable to that context, but in our minds, we were generating more general theory.

Q. Among other things, did you look at the juvenile salmon?

A. Yes.

Q. And as a result of that work that you did with Dr. Anderson, did you write a book?

A. Yes.

Q. Just for the record, I'm holding the book in my hand. It is blue. Entitled Design & Analysis Methods for Fish Survival Experiments Based on Release Recapture" and you're the lead author?

A. Yes.

Q. Published by the American Fisheries Society?

A. Yes.

Q. And can you tell the Court, just generally, it's about 400 pages. I don't need 400 pages worth. Just generally, what's in this book?

A. Methodology for experiments where you would have marked and -- marked control and treatment animals subject to some sort of a treatment, such as releasing fish above a dam directly into the turbine intake essentially and releasing controls just below where the outtake comes, that constitutes the control treatment setup.

But it could be other things. This has been used on this -- this type of idea has been used on waterfowl where the treatment was giving them one, two or four lead pellets put down their throat because we were concerned about lead poisoning and issues going on. And it has other applications.

So it's a book about how to use capture-recapture ideas and models in the context of deliberate experimentation.

Q. In September of 1988, did you move back to Colorado?

A. Yes.

Q. Back with the US Fish & Wildlife Service?

A. Yes, at that time, Fish & Wildlife Service. It was within the context of a program that was a cooperative of Fish & Wildlife research units, which are at Land-Grant University. The program started in 1935.

When you're in that program, you have to be accepted at the university as qualified to be graduate faculty, to

teach graduate courses, to have students. And the nature of the work is almost as if you are faculty on there. But you are a federal employee doing research that has relevance to concerns of Fish & Wildlife -- US Fish & Wildlife Service for management of wildlife.

Q. And during this stint, in September of 1988, you worked there with the US Fish & Wildlife Service for a little over 20 years?

A. I worked in that position for 21 years.

Q. And Mr. David Anderson, was he there as well?

A. He was the unit leader. He is now retired also.

Q. And can you tell the Court, over that period of time, 20 years, did you work with a number of different animals or species?

A. Oh, yes. Worked on marine -- I worked with people who were working on these things. Marine mammals, deer, elephants in Africa, even sometimes some insect data. When I say "data," working with other people who have collected the data or historical data.

Q. Fish?

A. Yes. Oh, yes, definitely fish.

Q. Waterfowl?

A. Waterfowl, yes.

Q. Spotted owl?

A. Ah, the spotted owls. Shall I say more about that?

Q. Well, not yet.
A. Okay.
Q. That's another case.
A. Yeah.
Q. Did you -- did you and a number of other people write a book in connection with the work that you've done with respect to the northern spotted owl?
A. Quite a number of publications. And that's actually a monograph hard bound, but yes.
Q. And for the record, I'm holding it in my hands. And what is, just generally speaking, this book about? It's entitled "Population Demography of Northern Spotted Owls."
A. Studies on the northern spotted owl have been going on for about 25 years now, a number of different places. Every so often we've had an analysis, a thorough analysis of all extent data. That one reports the analysis we did in a major workshop meeting in January of 2009, I believe it was.
Q. This is a recent publication?
A. Yeah, I've only had my hands on it for ten days. Yeah, yeah, very recent. So looking at the capture-recapture and other data on the northern spotted owl. Looking at the population dynamics, looking at what impacts survival, looking at what seems to impact fecundity, reproductive success on them. And in general, looking at the trends in the northern spotted owl. Some of that was tied into habitat cohorts and

characteristics. It's an application to capture-recapture on the owl, but some of the same concerns, issues, thinking that are going on with the fish.

Q. Did your colleague, Dr. David Anderson, chair a committee with respect to the northern spotted owl?

A. Yes, when it heated up, they appointed a committee to look into it. They should be listed. And David chaired that committee.

Q. And you were on it?

A. No, I was not on the committee.

Q. Okay.

A. I was back in Colorado. He was in Oregon. I kept getting emails and phone calls and ended up doing a lot of involvement with the issue and the data. And that's why I've been involved ever since in the analysis of those data.

Q. All right. From 1988 to 1992, did you and Dr. Anderson and two other scientists from France receive funding from the National Science Foundation?

A. Yes. A special program for a mode of encouraging international cooperation. People are working on the same issues in different countries and often they don't get together enough. And so you have separate lines of research going on.

And yes, we worked together and produced a monograph, published an ecological monograph which established a new

frame of the way of thinking about analysis of capture-recapture data.

Q. And how many times has that publication been cited by your peers in your profession?

A. In the vicinity of 1,700 times.

Q. You were promoted to senior scientist in August of 2004?

A. Yes.

Q. Is that the highest position a scientist can obtain in the federal government?

A. Yes, that's the highest level.

Q. What is your understanding as to how many senior scientists there were when you received that title?

A. I may forget the exact number, but they have a -- they had a cap on it of, I think, it was 43. You could only have 43 people at that level. And this was to keep the -- the quality of that level high. You had it -- it takes some doing to get promoted that high.

Q. That's 43 out of how many?

A. Total people in the interior then was somewhere around 15,000. Certainly many thousand. The number of those were scientists were less, but certainly in the thousands of people were categorized as scientists and hence eligible.

Q. Just briefly, you taught graduate courses?

A. Yes.

Q. At Colorado State University?

A. Yes.
Q. You taught a course on the design of Fish & Wildlife studies?
A. Yes.
Q. Sampling and analysis of vertebrae populations?
A. Yes.
Q. Numerous times you've taught a course on design of Fish & Wildlife studies?
A. Several times. Yes.
Q. You've taught a graduate seminar on the finite sampling theory regarding wildlife and natural resources?
A. Yes.
Q. You taught a course on the principles of probability sampling?
A. Yes.
Q. And multiple times you've taught a course on sampling biological populations?
A. Yes.
Q. Briefly, on professional societies. Since 1967, you've been a member of the American Statistical Association?
A. Yes. 44 years now.
Q. Became a fellow of that organization in 1990?
A. Yes.
Q. Since 1968, been a member of the International Biometric Society?

A. Yes.
Q. Since 1973, you've been a member of the Institute of Mathematics --
A. Yes.
Q. -- & Statistics?
A. Yes.
Q. And you have served in the past for three years as an associate editor of Ecology?
A. Yes.
Q. You've also served as an associate editor for three years at Biometrics?
A. Yes, in the past. Yes.
Q. In 2007, you were president of the Western North American Region of the International Biometrics Society?
A. Yes.
Q. And you have in your lifetime published close to 200 publications and reports?
A. I'd say rounding off 193.
Q. All right. That's close to 200 in my book.
A. Yes.
Q. But I'll take that. And in addition to the books I've shown you, you've published other books as well?
A. Yes.
Q. One of the other books that you published is Model Selection and Multi-Model Inference -- for the record, I'm

holding it in my hands -- a Practical Information Theoretic Approach?

A. Yes.

Q. It is now in its second edition.

A. Yes.

Q. Do you remember when the first and second edition were published?

A. The first edition was 1998, and that was in 2002. 2002? Yes.

Q. And your co-author is --

A. David Anderson.

Q. The person we've been discussing.

A. Yes.

Q. And tell the Court just briefly, this book is close to 500 pages. Tell the Court just briefly what this book is about.

A. We've talked -- the issue of models has come up here a lot. In particular parametric models. They're models, we know the structure and they're parameters, they're unknown values which we fit from data. It's a very common paradigm in statistics, whether you're a frequentist or Bayesian.

But in these areas dealing with natural resources and things that aren't tightly controlled experiments, and even sometimes there, you don't know exactly what's the correct model. There isn't a correct model. There is a variety of models you can specify with -- in capture-recapture, with

issues like should the parameters -- we may have multiple years of data.

And so you've got survival, annual survival through a variety of years. You've got males and females, you may have age in there. So do the parameterizations need to be time varying? Do they vary by male/female? What effects these things going on. You don't know.

Well, each of those issues corresponds to a different model. How do you select which model? We generalize in there, that was the other -- the older way of thinking. We generalize in there to the issue of establishing data supported weights for these models. What does the data have to say about the strength of evidence for each model, conditional on the model in the set? And that's what the book is about. The methodology and what you can do with all of that.

So while it's for model selection, it really goes beyond that to how can I make inference from all of the models by creating an appropriate set of data driven weights on these. And then proceeding, once I have those.

Q. Your information in the book, can it be applied to someone who wants to look at fish modeling?

A. Yes. It's anything. Fish, wildlife, it's not -- the methodology is not specific to this or any other area. It can be used across all sorts of applications.

Q. Doctor, how many times, generally, have you been cited in peer reviewed publications?
A. It -- a minimum of 14,000 times.
Q. Currently, you are working on a UN program in Africa monitoring the unlawful killing of elephants?
A. Yes. There's a treaty, international treaty known as CITES, Convention on International Trade in Endangered Species of Fauna and Flora. These -- that treaty, that program, CITES, has various projects. They funded -- they initiated and funded a program called MIKE, Monitoring the Illegal Killing of Elephants. Sorry, I get going too fast no doubt.

That's been around for a little more than ten years. The issue there is related to the illegal ivory trade and the poaching of elephants to feed that illegal ivory trade. CITES is trying in various ways to do what they can about that.

Our project is more on the science side of can we monitor this rate of illegal poaching, can we tell where it's highest or lowest, can we tell what the trends are in it. Can we -- most recently, can we estimate in any reliable sense the numbers of elephants that are being illegally poached. So I'm involved in that project.
Q. Doctor, are you familiar with EURING?
A. Yes, European Union for Bird Ringing.
Q. It's all caps, E-U-R-I-N-G.
A. Yes.

Q. And can you tell the Court just briefly, what is EURING?
A. I mentioned -- it came up before here. I worked with banding of waterfowl in this country. It's easy -- somewhat easy in North American. There's Canada, the US and Mexico to coordinate with on these banding programs. Canada wants to band, we want to band. You've got to use the same bands and coordinate the band numbers.

Europe is a little -- same issue, but much harder when there's a couple of dozen countries. They all want to do banding, but you have to coordinate this so the bands are different. So the same band number does not occur in being put on a bird in the Netherlands and one in Poland. So EURING coordinates the bird -- and they call it ringing across all of Europe and actually into Africa. And so the bands are unique everywhere.

They also coordinate where the data comes back to. So the type of data you get on this is when a bird -- abandoned animal, bird is found dead or shot and recovered, band in hand, we want people to report that to a central authority. So all of the data comes back in there. And that is now being done by British Trust for Ornithology in the UK. And so EURING coordinates all of these activities. And given they do that, then they got concerned with how do we better analyze these data.

Q. Have you been involved with that organization for 25

years?
A. Yes. I had to think about the dates on all this.
Q. Are there technical meetings held by that organization every three years?
A. Yes. That's where I said they got concerned about the good analysis of the data and they instituted a meeting, which they thought might be one time in February of 18 -- 1986 in Wageningen, Netherlands to look at the issue of how do we better analyze these data.
Q. And at these technical meetings of EURING, are new models presented and discussed to advance the state of the art?
A. Yes. Very much.
Q. You mentioned the first meeting of this organization in February of 1986, did you attend?
A. Yes.
Q. How many Americans were invited to attend that meeting?
A. Just two. Myself and David. We were invited by the EURING organization because of the work we had done on analyzing bird banding data.

We'd published with two other people a moderately large monograph on the methods and the models for analysis of such data. And nothing like that had been done before. And to some extent that motivated the EURING folks to say they needed to catch up on how to analyze these data.
Q. You mentioned you and David were invited. Would that be

Dr. Anderson?
A. Oh, yes, Dr. Anderson.
Q. The methodologies that you discussed at EURING, are they applicable to fish?
A. Yes.
Q. Have they been used with respect to fish?
A. Yes. They've been used with respect to fish.
Q. You said you attended the first meeting. How many meetings have there been, these technical meetings that occur every three years --
A. There have now been nine such meetings.
Q. And of those nine meetings, how many have you attended?
A. All of them.
Q. Has any other American or US citizen attended all nine of those meetings?
A. No.
Q. How many other people in the world have attended all nine of those meetings?
A. One. Pertti Saurola from Finland.
Q. All right. Almost finished with your qualifications. Just two weeks ago, can you tell the Court what you were doing professionally?
A. I had been -- I was invited to be part of a small review team to look at the monitoring program on something known as the endangered Sage sparrow. So I was on San Clemente

Island. This is one of the Channel Islands in California, it's the southernmost one. It is entirely owned and operated by the US Navy for advanced training of all sorts and what they do. There are a number of endangered species there. This is one of them.

The Navy pays -- it's paid over time quite a bit of money for the monitoring of it. And it's being actively monitored for about 11 years and they thought it was time to take a hard look at the monitoring program. And so we did. And this was to come up with any recommendations for changes.

Q. You're basically there to change out their monitoring program, to make sure it's a good program?

A. Yeah. And basically it's pretty good. The main thing I would have to say about it is it sort of recognizes itself. They started monitoring in the area of about the 20 percent of the island where they knew is high density of this Sage sparrow, and, over time, they started to realize that they were occurring elsewhere as well. In fact, they seem to be expanding on the island.

So one of the key issues that they wanted support from us on is they need to expand the monitoring to elsewhere. This is a common issue I've seen in monitoring wildlife. They tend to start in core areas where they know there are a lot of animals, and they either act like there aren't any anywhere else or they ignore that issue, and the next thing you know

they realize that they're only monitoring a part of the population, making it difficult to make inferences about what's going on with the entire population.

Q. All right.

A. And this is one case exactly like that.

Q. Doctor, earlier this year, were you informed that you were the recipient of the Wildlife Society's Aldo Leopold Memorial Award for 2011?

A. Yes. That was in a letter which three weeks later they sent me an email and said I'm supposed to keep it quiet. But --

Q. Well, we won't tell anyone.

A. Okay.

Q. Is that the highest honor bestowed by the Wildlife Society?

A. Yes.

Q. For distinguished service to wildlife conservation?

A. I believe that's the way it's worded.

Q. And David Anderson, your co-author who you discussed, has he also previously been a recipient of that award?

A. Yes.

Q. One of your other co-authors on the Blue Book is Gary White. Is Gary White another prior recipient of that award?

A. Yes.

Q. Doctor, would it be fair to say that you've devoted most

of your life to helping people to safely conserve and manage animal populations?

A. My professional life -- yes, in terms of the contributions I make in the statistical arena.

MR. GONZALEZ: Your Honor, we offer Dr. Burnham as an expert in statistics, model selection and population sampling.

THE COURT: Any objection?

MR. EDDY: No objection, Your Honor.

THE COURT: All right. The Court finds that Mr. Burnham -- Dr. Burnham, whichever you prefer, is qualified by background, training, education and experience in the fields of statistics, model selection and population sampling. You may proceed.

MR. GONZALEZ: Thank you, Your Honor.

Q. Doctor, let me start off by asking you generally. When you are asked to analyze what factors might lead to the decline of a population of species, what do you rely on?

A. Data.

Q. What do you mean by "data"?

A. Quantitative numbers that have been collected in some way directly relate to the individual animals and where they are, which will implicitly and explicitly contain information about their numbers, their trends over time in numbers, their survival rates, which are survival probabilities, and their fecundity, their reproductive aspect, how many juveniles are

being produced.
Q. Doctor, did we ask you to come to court to render an opinion on whether the delta smelt will be harmed if the fall X2 action is not implemented?
A. Yes, you did.
Q. And in preparing to testify, have you reviewed the BiOp in this case?
A. Yes.
Q. Have you reviewed the reports or articles of Mr. Feyrer in 2007, the draft in 2008 and the final version of his article in 2011?
A. Yes.
Q. Have you reviewed the recently published article by Doctors Deriso and Maunder?
A. Yes. Yes.
Q. Have you reviewed the two articles that Mr. Feyrer co-authored with MacNally and Thomson in 2010?
A. Yes.
Q. Have you reviewed the article published by Dr. Kimmerer in 2009?
A. Yes.
Q. And have you reviewed the declarations filed by Mr. Nobriga and Dr. Norris on behalf of the defendants in this case?
A. Yes, I have seen those, yes.

Q. And based on your work experience and your review of those materials, in your opinion is there any reasonable scientific basis for concluding that the delta smelt will be harmed if the fall X2 action is not implemented?

A. No.

Q. If someone were to argue in this Court that you have to implement the fall X2 because if you don't, the delta smelt population would be harmed. In your opinion, would there be any reasonable scientific support for that assertion?

A. No. In all of the looking at this, I was looking for evidence that would bear on that. And my answer is based on looking for said evidence.

Q. Doctor, if you were asked to study whether the location of X2 was relevant to the decrease in the population of the delta smelt, what would you look at?

A. I would look at a time series of at least annual data on what is the size of the population from year to year to year and where has X2 been. I would need -- I would want to know the size of the total population of these in -- and what was X2. And then is there any correlation in there or are they perhaps not looking correlated.

Q. Would you consider population dynamics?

A. Yes.

Q. Why?

A. Well, population dynamics are underlying what's going on.

If something is having a causal relationship, it needs to show up in basically some of the vital rates in their survival. And/or their ability to reproduce.

Q. Did the government do that in preparing the BiOp?

A. Not that I -- I don't think so, I don't remember that stuff being in there.

Q. Doctor, given your work for the past 35 years and your review of materials in this case, if this Court were to decide to issue an injunction stopping the implementation of the X2 program scheduled for September, would you be concerned that the delta smelt population would be jeopardized somehow?

A. No, I would not.

Q. Why not?

A. I do not see any evidence that X2 is impacting the population dynamics of it.

Q. Doctor, are you familiar -- I think you've indicated you were -- with the article recently published by Dr. Deriso and Dr. Maunder examining the delta smelt?

A. Yes.

Q. In your view, was that article prepared in a reasonably scientific way?

A. Yes.

Q. Are you familiar, doctor, with Dr. Kimmerer's publication in 2009?

A. Yes.

Q. If you'll turn to Exhibit 11.
A. Okay.
Q. Is that Dr. Kimmerer's article?
A. Yes. Let me ver -- yes, yes, that is.
MR. GONZALEZ: Your Honor, we move Exhibit 11 into evidence. It's the entire article.
THE COURT: Any objection?
MR. EDDY: No, Your Honor.
THE COURT: Exhibit 11 is received in evidence.
(Metropolitan Plaintiffs' Exhibit 11 was received.)
BY MR. GONZALEZ:
Q. Doctor, can you tell the Court just briefly what Dr. Kimmerer examined in that article?
A. He examined all sorts of things about the sum of the species in the San Francisco Estuary and associated Delta.
But in particular, what I was looking at is he looked at the delta smelt. And he looked at the -- their abundance or index of their abundance in relation to factors that might be affecting that through time.
Q. And what conclusions did he reach?
A. Well, see it's showing up on the screen.
Q. I thought I'd help you --
A. Abundance of delta smelt did not vary with X2.
Q. Consistent with Dr. Deriso?
A. Yes.

Q. In your view, was Dr. Kimmerer's article prepared in a reasonably scientific way?
A. Yes.
MR. GONZALEZ: For the record, Your Honor, I'd like to read just two lines out of Dr. Kimmerer's report.
It says, "Abundance of the delta smelt did not vary with X2. Despite the evident increase in the amount of habitat, delta smelt abundance appears to be regulated by other factors so far unidentified."
Q. Doctor, are you aware of any published study or analysis that, in your view, finds in a scientifically reliable way that the location of X2 can have an impact on the population of the delta smelt?
A. I am -- no, I am not.
Q. Let me ask you just a few questions about Mr. Feyrer's work. In your view, doctor, can a reasonable scientist rely on Mr. Feyrer's work to conclude that the location of X2 will impact the delta smelt population?
A. No.
Q. And why not?
A. He didn't really address the key question there.
Q. Which was?
A. Just that, does -- is the -- the numbers for population size of delta smelt, as we vary that through time, is that affected by the location of, in this case, fall X2. He looked

at other things, he -- several issues of what he looked at.

One, you have the fall midwater trawl data, which is counts of what they capture, they capture at the stations. So that gives you some idea of index to abundance of those stations they look at. But they were not looking everywhere, which is one issue.

What he then did with it is collapse it down just to presence or absence. So that starts to lose information on the actual abundance. It does give you information about spatially where they are, if you show some differences going on there.

What he then did was try to relate that back to things that are tied to habitat. But he only looked at abiotic issues, namely a measure of salinity and temperature and a measure of turbidity, the Secchi depth.

So those three things, which are abiotic, they do not capture all aspects of habitat. So to turn around and say, well, I looked at -- I have an index of habitat, it's not what I would want to think of as a proper index of habitat by virtue of leaving some things out.

But then, that was fit -- that was created by fitting the presence/absence data to those factors to see if, indeed -- and they do -- influence where you catch things in the trawl. So you can say that the data presence/absence are affected by some of these things, which is telling you yes.

The smelt would be certain places rather than others based on some factors.

Then he went -- and trying to relate this to spatial area, each stations' considered to be associated with an area. There's some uncertainty about those areas. And this created the habitat quality index, so there's several steps that went on there.

And then, as I recall, having gotten that, and relating that to presence or absence, he said that that habitat index was correlated to some extent with X2.

So you have this sequence of steps from actual abundance index, down to just presence, to relating to abiotic variables and a correlation with X2. When the actual question to me would be that I would want to look at is what is a reliable estimate of population size or index to total population size, everywhere, and how does that relate over time to X2.

Finally, something else that was not done there that -- which really should be done is a statistical analysis of data when you're making an inference -- is there was no assessment of the uncertainty of these things as he went along. No -- nothing associated with the final result, which is in the spirit of an uncertainty of that thing, a margin of error is what we -- people call it in human surveys. But when you're making statistical inference from data, it is certainly

expected in good science that you will quantify the uncertainty of your inferences as well.

Q. Let me break that down.

A. Okay.

Q. You said he didn't look everywhere.

A. Well, the data do not come from everywhere the smelt are.

Q. And why, in your opinion, is it important to use data from everywhere where the smelt are?

A. This is to be a population level assessment. The entire population. Not a fraction of the population. If there's significant portions of the population that are outside of the sampling that aren't represented, then your inferences don't cover them. And as we're finding out, there seem to be some quite upstream at areas where X2 would not affect them.

Q. And then you said he looked only at presence/absence.

A. Yes.

Q. Why is that an error in your view?

A. We want to know about abundance here. How is X2 or any other factor affecting the abundance. And spatial distribution, whether present or not present, does not adequately index total abundance.

When you go the way of -- if they're absent, you know, there's nothing -- you didn't catch anything. If you caught something, you reduce that to just, yeah, I caught something. Well, did you catch one or did you catch 10 or 20?

How many? What's the actual abundance? Not just the distribution.

Q. Then you said he looked only at abiotic factors. What are the biotic factors that, in your view, he should have but did not consider?

A. Well, these are primarily -- I'm not a fish biologist. These are primarily what the delta smelt eats and what eats it. So your prey and avoiding being predated on. This seems -- this is certainly a very important matter.

Q. Why?

A. Well, if you don't have anything to eat, you don't live very well. And if something eats you, you don't live and reproduce.

Q. All right. Are these two things that, in your view, were pretty obvious that should have been included in this analysis?

A. Yes.

Q. And then you said "no assessment regarding uncertainty." Is that referred to as uncertainty analysis?

A. Well, yeah, it's just standard when you're fitting data to models and there's uncertainty about the inferences, to quantify some measure of how uncertain that is.

Q. And by not doing that, was he compounding the error every time he looked at different data?

A. Well, these several steps that go on, there's uncertainty

in each step and sensitivities in each step. And there was no assessment of those issues.

Q. So should there have been a margin of error analysis at each step along the way?

A. That would be preferable. And -- but what you really want is at the last step.

Q. And why is that so important?

A. So we know how well estimated these relationships are between even the abiotic factors, the salinity issue and the turbidity as indexed by Secchi depth. Because some significant relations were found, but we really don't know -- well, actually, I have to back up.

I don't know if they were significant or not in terms of the standard way of proceeding to doing that, of putting a measure of uncertainty on this. And if you like, people are familiar with this whole P-value concept, a measure of significance underlying, it was not associated with it.

Q. Doctor, just a couple more questions.

Even if we assume for purposes of argument that the location of X2 could impact the delta smelt, is there any information in the BiOp and Mr. Feyrer's reports, or in any of the declarations that the government has filed that you've looked at, that a reasonable scientist could rely on to determine where X2 should be located?

A. I think not.

MR. GONZALEZ: Thank you. That's all I have, Your Honor.

THE COURT: Let me ask Dr. Burnham. How important, in the process that you have described, is this aspect of population that you talked about?

THE WITNESS: I would say that's very important. We're talking about the delta smelt as a species, as a population of them there. And we're interested in population level effects.

To me, when you talk of jeopardy of possible extinction, it's extinction of all of them. Wouldn't be extinction of them low down if there's some segment of the population which is not affected by X2 or whatever and wouldn't be in jeopardy of going extinct, that's pretty important to know. In a normal population assessment, we want to consider the entire population and what is happening to it.

THE COURT: Is that something that, in the regular course of the practice of the science, you are discussing that agencies that are examining these issues of survival and of jeopardy, is that normally done, a population assessment, for a species?

THE WITNESS: Yes. Because you're talking of jeopardy to a species. So the inferences are to the entire species.

THE COURT: And do you recognize the term "life cycle

model"?

THE WITNESS: Yes.

THE COURT: What does that mean to you? Or how do you understand the term?

THE WITNESS: It's in substance population dynamics. Meaning we deal in this idea of the population dynamics of what affects survival through time, what affects the reproduction of these things. And in, say, the owls, we don't use the word "life cycle" because a given pair of owls can live many years and produce young many, many times.

In fish, in this case in particular here and salmonids, if the fish basically only has one opportunity to reproduce, like salmonids, we talk of life cycle. Your cycle is egg to juvenile, to adult, to reproduction and that's it for you. So life cycle, to me, just means a special type of instance of population dynamics modeling.

THE COURT: Is this, then, information that is or is not necessary to the analysis that we're doing here?

THE WITNESS: I think it's necessary to the analysis that's going on here, yes.

THE COURT: And with regard to what you've read in this case, did you encounter the opinion that there is not enough population data for this species, the delta smelt?

THE WITNESS: I was going -- yeah, I'm surprised that the amount of population data on the entire population is a

bit lacking. Yes, to do a good job of the assessment that's going on, there should be better estimates of population abundance or better indices of them, I think.

THE COURT: And what about the subject of the life cycle model, did you determine whether or not, for this species, if it is appropriate, it was or was not what you would think was a reliable scientific life cycle model?

THE WITNESS: What seems to be the case, at the time of BiOp -- I did not perceive it in there, but people have been doing them since then, so progress is being made. That has been mentioned before that you continue to improve these. So that may happen. But we do have a useful -- some useful life cycle models, I believe, on which key inferences can be made.

THE COURT: Those are --

THE WITNESS: Those key inferences --

THE COURT: Those are temporally from what period of time, the existence of those life cycle models that you think are useful?

THE WITNESS: I mis -- I'm not quite sure what --

THE COURT: Well, if the world here is being measured from December of 2010 -- I should say 2009, and we are talking about an inquiry that commences in approximately 2005, 2006. What did you note, if anything, with regard to life cycle models in that time period?

THE WITNESS: Well, the life cycle models that have been produced used data going back before then, which is fine. And hopefully, as far as I know, they're going to be applicable at this time in the near temporal future.

THE COURT: And in giving your opinion --

THE WITNESS: Yes.

THE COURT: -- that the X2 factor, if you will, does not bear the scientific relationship to explain the effect the location of X2 has on first the species itself and its continued existence --

THE WITNESS: Well, the -- the abundance, I'm -- I'm not looking as to whether it has any influence on spatially where they are, but rather does the location of it in, say, fall correlate with more or -- more of them or fewer of them in the next year. Is it influencing the population dynamics? And I'm only looking at the evidence other people have presented. And I was asked to look at this because of the statistical nature of it.

And presented to me was that we don't understand all the statistics. Is this stuff okay? Is this standard stuff? Is somebody fooling us? And no, the answer is very simple to me, this is standard statistics. The methodology that has been applied is legitimate.

And so to the extent, then, that the data are appropriate and reliable, although could be a little better,

why then I'm willing to believe the results will come out. They're the ones that come out with the results that say "we found no evidence that X2 is a factor in affecting the population dynamics."

THE COURT: Who's the "they"?

THE WITNESS: Huh? Pardon?

THE COURT: Who's the "they"?

THE WITNESS: Oh, like Kimmerer's article we just looked at here or most recent one was MacNally, et al.

THE COURT: Well, what about the government agency's scientists that find it's quite significant? In other words, the location of X2, because they have made this one of the foundations for the reasonable and prudent alternative to the continued existence of survival and recovery of the species and its habitat.

THE WITNESS: They seem to be relating -- I'm not sure what they were doing. They seem to be relating location of it to where the delta smelt are. This goes back to the -- Mr. Feyrer's work, which you could take that and say it seems to be affecting where they are. But that's not the same as saying is it affecting how many there are and affecting the population dynamics. Not where they are, but survival rates.

THE COURT: All right. And then what is the reason that you say it does not affect the abundance?

THE WITNESS: It is the results given in these

articles that were mentioned, such as Kimmerer's brought into evidence and the work of Maunder and Deriso. And quite independent work of the very nice article recently by Ralph MacNally and a whole bunch of other people, took a very intensive look at some of this.

And they looked at all sorts of things which were -- from the data, could be said to be affecting the population dynamics, and hence potentially or actually the abundance of the delta smelt. And including X2. And they said we didn't find any evidence in the data that X2 is affecting the population dynamics, the numbers of them and the population --

THE COURT: And if it's possible, can you state what the reason for that is? Or reasons?

THE WITNESS: Reasons, if I understand --

THE COURT: That there is no correlation --

THE WITNESS: Oh.

THE COURT: -- between X2 and the abundance of delta smelt.

THE WITNESS: Why they would find that, I do not know unless there's no relationship showing up in the data.

THE COURT: It is the data, then, that is the explanation?

THE WITNESS: Yes. The inference is coming out of the data. You can't easily just look -- you can't too easily look at the data and make that inference. Although something

one could do would take the fall midwater trawl and take the abundance index, which is computed from that, and for the same year X2 -- and you might have to lag things a little bit, to look at X2 last year, abundance next year.

But you're looking at this time series of abundance index and X2. I looked hard in the BiOp, I didn't find that direct comparison. Some of these other things I did not find that fairly simple direct comparison. I would have done that in addition to the population dynamics.

THE COURT: All right. Let's take the afternoon recess. We'll stand in recess until 25 minutes after three.

(Recess.)

THE COURT: We're back on the record in the consolidated delta smelt cases. And we're going to resume Dr. Burnham's testimony.

Does any other plaintiff have questions for Dr. Burnham?

MR. WILKINSON: No, Your Honor.

MR. SIMS: No, Your Honor.

THE COURT: Cross-examination.

MR. EDDY: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. EDDY:

Q. Good afternoon, Dr. Burnham.

A. Good afternoon.

Q. My name is Ethan Eddy, I'm an attorney with the United States Department of Justice. I'm one of the lawyers for the defendant federal agencies.

To start us off, Dr. Burnham, I believe you testified you're being paid for your work in this case; is that right?

A. Yes.

Q. Does that include the time that you're spending in court with us today?

A. Yes.

Q. Are you getting paid by the hour for that?

A. Yes.

Q. And what hourly rate are you charging?

A. 150 an hour.

Q. In addition to that hourly rate, are you being paid any sort of other flat fee?

A. No. Just expenses.

Q. Is there any cap on your fee amount?

A. Yes, I believe the contract had a cap of 80 or $90,000. I haven't looked at it lately.

Q. Do you recall how much you've been paid so far for your work in this case?

A. It's in the vicinity of 50,000, I think.

Q. Dr. Burnham, you wouldn't consider yourself a delta smelt biologist; would you?

A. No, I am not.

Q. Do any of your many, many publications pertain to the delta smelt?
A. No.
Q. Have you done any work at all about the delta smelt --
A. No.
Q. -- prior to this litigation?
A. No.
THE COURT: Wait for the question to be completed before you answer.
THE WITNESS: Sorry.
THE COURT: Had you completed your question?
MR. EDDY: I had. And I think I heard the answer.
THE WITNESS: No.
BY MR. EDDY:
Q. No involvement prior to the delta smelt litigation?
A. No involvement.
Q. Earlier you testified you had received the Wildlife Society Award; is that right?
A. They selected me for it, the formal presentation occurs at the annual meeting this November.
Q. You don't have the trophy yet, you just know you're getting it?
A. Yes.
Q. And the Wildlife Society, Dr. Burnham, that's an organization that represents wildlife managers. It's not a

wildlife protection advocacy association like Humane Society, is it?

A. It is -- let you finish.

Yes, it represents managers, but it especially represents wildlife science.

Q. Thank you. And you testified -- or maybe it's in one of your declarations, your signature line, that you live in the City of Fort Collins in my home state of Colorado; is that right?

A. Yes.

Q. Dr. Burnham, are there any estuaries in Colorado?

A. Certainly not very many. Well, if you mean in terms of tied in with salt water, no.

Q. Just start with the basics.

Dr. Burnham, have you ever written a biological opinion?

A. No.

Q. Have you ever made a jeopardy determination, as that term is defined in Section 7 of the Endangered Species Act?

A. No.

Q. And you testified during your direct testimony, I believe, regarding whether certain things caused harm or didn't cause harm to the delta smelt. Is that correct?

A. I need a little clarification on that issue.

Q. I believe that you used the word "harm" in your direct

testimony today. At the outset of your direct testimony, you were asked as a general matter whether enjoining the fall X2 action would, in your word, I believe, harm the delta smelt or not.

A. Oh, yes.

Q. Do you recall that?

A. I did.

Q. Dr. Burnham, to your knowledge, is the term "harm" part of the section -- of Section 7 of the Endangered Species Act?

A. I do not know.

Q. Have you studied estuary environments before, Dr. Burnham?

A. No.

Q. Well, based on your general knowledge of environmental factors and biology, would you agree that it's a reasonable ecological premise to expect that variation in river flow would translate into variation in estuarine habitat conditions?

A. That I do not know. It would presumably affect some things. But habitat relates to animals. And I do not know to what extent it affects their habitat.

Q. Let's take a look at a concrete example so that we can get a little bit more specific here.

I'm going to ask you to assume -- for the sake of this question, let's say we have a fish species somewhere on the lower Colorado River, and then that river, over time,

completely dries up. And over time dams are built, no longer reaches the Pacific Ocean, turns into a desert. Would you say there's no change in the habitat there?

A. No, I would not say that.

Q. Dr. Burnham, have you reviewed the declarations filed by Dr. Charles Hanson this summer in this case?

A. Yes.

Q. So are you aware that Dr. Hanson disputes the notion that X2 is related to delta smelt distribution?

A. I do not recall that aspect of his declaration.

Q. Assuming that he had said that, would that be contrary to the opinion that you just gave the Court before the break and before I came up here, when the Court asked you whether the literature had supported a finding that X2 was related to distribution? Not abundance, but distribution.

A. I did not focus on that. I don't recall, although I was willing in my thinking that it could, in fact, affect spatial distribution. And that is a different question than whether it is affecting numbers.

Q. Okay. But as far as the spatial geographic distribution, I believe that's what the Court had -- that's what the Court had asked you.

A. Yes.

Q. And --

A. They are fish, they can move.

Q. Let's take a look now at an exhibit that we're going to hand out and pass to you. I think this has also been marked by the plaintiffs, but not used by them yet. So we've marked this as Defendants' Exhibit 514. Bring you a copy of that.

Let's wait a second while everyone's getting it here.

Taking a look at that first page there, Dr. Burnham, does this appear to you to be one of the declarations of Dr. Hanson that you reviewed dated June 16th, 2011?

A. Yes.

Q. All right. Let's turn now to page 19 of that document, if you would, please. And you'll see there an image labeled Figure 7.

A. Page 19. Figure 7?

Q. Figure 7 on page 19.

A. Oh, okay. There's two page numbers on this.

Q. Oh, I'm sorry. Let's use the page number at the bottom, please.

A. Well, yeah, in the middle?

THE COURT: In the middle.

THE WITNESS: Yes.

BY MR. EDDY:

Q. Oh, I'm sorry, we've actually got three sets of page numbers going here. So on the top one --

A. Oh, yes.

Q. -- it's page 20 and in the middle it's 19 and I don't know

what's on the --

A. Right.

Q. But Figure 7, you're with us.

A. Yes.

Q. Okay. And it may have been a while since you looked at this, so if you need a minute to re-familiarize yourself with this image and its discussion in paragraphs 22 and 23, please do that. If you are sufficiently familiar with it, we can proceed.

A. Okay.

Q. Okay. Ready?

Is this -- Figure 7, the label there at the bottom, does that say "Estimated survival of delta smelt collected in the CDFG FMWT" -- that's F as in Frank -- "and September to October X2 location"?

A. Yes.

Q. I've got it up on the Elmo as well. This figure represents the survival rates of the delta smelt population over the period from December -- I'm sorry, from September to December during the given years; is that correct?

A. Yes.

Q. So can you tell us, does each one of the points here, the squares, the blue squares above the line for 0.0, represent a year during which delta smelt abundance increased between the months of September and December within a single year?

THE COURT: It says September-October. And if December is on the graph, it isn't apparent.

MR. EDDY: Let me refer Your Honor and the witness to -- looks like we've got two captions here. We've got the Figure 7 label --

THE COURT: The upper caption.

MR. EDDY: I'm sorry?

THE COURT: The upper caption.

MR. EDDY: That's right, Your Honor.

THE COURT: All right. Refers to September-December.

BY MR. EDDY:

Q. So would you agree with that, Dr. Burnham?

A. I was studying this and listening. Agree with what?

Q. Let's go back to the question I just asked. So each one of these points above the line on the Y axis, 0.0, do you see that there? The line?

A. Yup.

Q. Each one of those points represents a year during which delta smelt abundance increased between the months of September and December within that individual year. Is that right?

A. No. I would not agree with the way you stated it. These are indices. This is what the index did. It's quite variable. So I would not conclude that the abundance of the actual smelt necessarily increased. The index varied quite a

bit. I would be a little reluctant to say that it necessarily increased. Because there's quite a bit of potential uncertainty associated with each one.

Q. Okay. So I think we've skipped ahead a little bit --

A. What I understand this to be is an index to survival in this period of time September to December.

Q. And that's my understanding too. We're just trying to get to the bottom --

A. Yes.

Q. -- if we can, of what this figure indicates.

And in your opinion, does each of these little boxes above the line 0.0 represent that delta smelt abundance increased during the period September to December? I'm not asking you whether that's actually the case, just asking you if it's your understanding that that's what this image displays.

A. It would be better to ask the person who produced it. But as far as I can tell, yes.

Q. Dr. Burnham, do delta smelt reproduce between September and December?

A. No. Well, not as far as I know. I'm not a fish person.

Q. Are you aware of any reports of delta smelt having been born after the month of June?

A. No. I'm not aware of any of that, no.

Q. Are you aware of any evidence that delta smelt can

asexually reproduce?
A. No.
Q. So every data point above this line is biologically implausible; is it not?
A. If you took that as truth, yes. But there's quite a bit we know. I know there's a huge uncertainty in these estimates from the data. And what you need -- I'm going to get ahead of you here -- or maybe you don't want me to go there. But what these --
Q. I think I'll --
A. What you do with these is look to see if there's a trend associated with where X2 is. And that's where it's relevant that the line that sits there and fits to these is essentially flat. And there's no evidence that there's a pattern here of a slope to that line, depending on where X2 was.

What he's looking to see is does an index to survival in that time period show an impact of where X2 does. And to me, this thing showed that there was no such effect of X2.

Now, the estimates of indices of survival are quite variable. I would not look at those in particular, but rather the entire pattern in relationship to whether there's a trend in this in terms of X2.
Q. Okay. So generally speaking, the data points on a plot like this are what is driving the trend or lack thereof, or shape of the fitted line; is that right?

A. The slope.
Q. And didn't you just testify that each one of these points above .0 is biologically implausible?
A. If they were true values, but these are estimates subject to quite a bit of uncertainty. That's why I would focus on the line rather than individual points.
Q. Okay. But let's say that we removed all of the biologically implausible data points above the 0.0. Would the shape of this line change?
A. My gut reaction is I don't think so.
Q. And you testified just a second ago that these are index variable indices with high variability within each one of those squares?
A. Yes. And they are indices as such. You would not interpret them as actual population size and I would not interpret them as an inference of things necessarily actually increased in any meaningful sense. I would do what was done here, get one for each year. And I'm looking to see if there's a distinct pattern associated with where X2 is.

It's not unusual in statistics in some cases like this to get estimates of things that are implausible, but it's still -- they still become useful to look at the patterns you get with them.
Q. Even if certain values are biologically implausible?
A. Yes.

Q. Okay. And given the variability and the implausibility, in paragraph 23. Does Dr. Hanson nonetheless conclude that this data, Figure 7, show no apparent evidence of a trend of increased delta smelt survival during the fall months in response to either fall X2 location or the estimated area of X2 for delta smelt presented in the BiOp? And that's the first -- that's the second sentence there.

A. On which page?

Q. 20. Paragraph 23.

A. Paragraph 23. Would -- okay, I'm not sure what you're asking in relation to that.

Q. For now I'm just asking if I've read that sentence correctly into the record.

A. Well, I'll assume you've read it correctly.

Q. I can do it again. So why don't we --

A. Sure, read it again.

MR. GONZALEZ: I'll stipulate you read it correctly.

MR. EDDY: Thank you, Mr. Gonzalez.

THE WITNESS: Okay.

BY MR. EDDY:

Q. So here, Dr. Hanson is drawing a conclusion about the actual population; is that correct?

A. The sample population. But he's drawing a conclusion from the stations where data were available.

Q. And he's made a conclusion as to survival, has he not?

A. Yes.
Q. Dr. Burnham, is salinity considered an abiotic habitat factor?
A. Yes.
Q. Are you familiar with any laboratory studies that have been undertaken to determine what water temperatures are lethal to delta smelt?
A. I'm not familiar with them. I have seen comments about the issue, but I'm not familiar.
Q. And from those comments, are you aware, generally, that those -- that those findings exist?
A. I know that there's -- at some too high of temperature, the smelt don't do well.
Q. Okay. And are you familiar with the laboratory studies that have been undertaken to determine what salinity levels are lethal to delta smelt?
A. No. I am not. I've wondered if there were such studies, but I have not seen the literature on them.
Q. But you didn't undertake to find that literature?
A. No, what I was asked to do here did not have any relation to that issue.
THE COURT: You know, while there's a break, can you explain whether or not there is a slope to the survival index back in this figure that you've been looking at that is in -- it's actually referred to as Figure 7 on page 19 of

Exhibit 514.

In other words, you said that there would be a slope. And these are points, data points, that are indices as you've described them. So is that a salinity index we're looking at? What is it?

THE WITNESS: No. Well, to me, this is -- you have a position where X2 has been in a given year, for September-October. You have monthly data. You look at this monthly data to -- from it to get an index of survival. And it's a quite variable index.

But I'm looking at the swarm of points over the whole years to see whether or not one -- I have those swarm of points. And if I would fit a line to them as a function of X2, which is the line here. Does that have a distinct slope, which would mean, then, that their survival is being, in those months -- the inference would be their survival is being affected by the location of X2. It is an index to survival. We cannot infer reliably actual survival from this.

But to the extent it's an index, I can infer whether or not X2 seems -- its location seems to have an effect on survival. If it did, I would expect a very distinct slope on this line, which is fit and it's practically flat. There's some things he did not do here, is give me a -- it gives a formula down here, gives me an standard error on that.

But I know something about statistics and these data

points and that line and I can tell you that that slope would not be significant, it would not be an inference of the impact of X2 location on survival. That's the inference I would draw from this. And it would not be affected by the fact that some of these points, if you try and interpret in some literal sense, would be impossible.

THE COURT: And are we looking at the line that roughly starts right around 65 and ends at 90?

THE WITNESS: Yes.

THE COURT: And so --

THE WITNESS: Somewhat --

THE COURT: That is relatively a horizontal line.

THE WITNESS: Pretty much. He does give a formula for it at the bottom, Y equal that negative .02. The thing -- the thing to look at, aside from -- if you don't see the -- you don't realize it, that wide set of points, spread of points, would not correspond to a significant slope is to look at the R-squared he gives at the bottom. R-squared equals .0019. That would not be a significant slope.

THE COURT: You may continue.

BY MR. EDDY:

Q. Let me followup on the Court's questions, if I could.

So let's go -- let's keep talking about Figure 7 here. Is it your understanding, Dr. Burnham, that for each of these squares above 0.0, that indicates that the delta smelt

population increased from September to December within a given year?
A. It indicates that the data, which are quite variable from month-to-month, were apparently showing the -- the index was showing a larger later on than earlier on.
Q. Is that a yes?
A. I think so.
Q. Okay.
A. I'm interpreting this in a statistical manner, which might not be the same way you're interpreting it.
Q. Dr. Burnham, does the quality of the data that we see here have any bearing on the validity of a statistical test?
A. In general, yes.
Q. So how can we test survival using survival estimates here that you testified were biologically implausible and that you testified represent that the delta smelt population, despite having no reproduction during these months, increased?
A. I would not make the inference that they increased. It was the data, which numbers increased. Those are sample data. Several stations. And that can happen, in particular if the numbers don't decrease by very much. If they're relatively stable, that could happen.
Q. All right. Let's put aside Figure 7.
A. And what comes to my mind, there's been a lot of banding data. If you take the survival --

Q. I'm sorry. I'm really sorry to cut you off, sir, but I don't think there's a question pending right now.
A. Okay.
Q. Before the Court's questions, I believe that you had testified that you had not reviewed studies regarding what salinity levels are lethal to the delta smelt because you didn't think those were relevant to the work that you had been asked to undertake; am I remembering that correctly?
A. That is correct. I was asked to look at certain things. I was never asked to get involved in that.
Q. Okay. Putting that aside for the moment, can you at least tell us whether, based on what you have read, would the delta smelt be able to live in the Pacific Ocean?
A. I don't know. The things I've read -- hmm. Nobody's looked for them there, so I don't know.
MR. GONZALEZ: There's probably a whole bunch out there.
THE WITNESS: Actually, I don't know that anyone's looked for them there.
BY MR. EDDY:
Q. So is it your testimony, then, that it's possible for delta smelt to live in the Pacific Ocean?
A. No, I have no testimony about such things. I am not a fisheries biologist.
Q. You're just not sure?

A. I'm not sure.
Q. Okay.
A. Not my area.
Q. All right. Now let's take a look at your reply declaration for a second. And that was conditionally admitted into evidence earlier as Plaintiffs' Exhibit 4, which I think is up there in your tabbed binder. If you would, please, sir.
A. Yes.
Q. And let's take a look at paragraph 13 of that, which is on page 5. And I think that's page 5 in all the versions of the pagination here.

Are you there on the page?

A. Yes.
Q. And taking a look at paragraph 13.
A. Yes.
Q. You state there, in that second and third sentence, do you not, that there is simply no scientific support for the position that, quote, "abiotic habitat factors are the underlying foundation that determines where an organism can live and reproduce," close quote.

And the quotation there, you've attributed to Mr. Feyrer. Is that right?

A. I see on line 19 saying there's simply no support. You mean what's in quotes before that?
Q. Right. So on -- starting at the beginning of line 18.

A. Right.
Q. You've got a quote there from Mr. Feyrer, stating that abiotic habitat factors are the underlying foundation that determines where an organism can live and reproduce.
A. Yes.
Q. And thereafter, you opine, do you not, that there is simply no scientific support for this position?
A. As far as I know, there isn't. You have to have the biotic as well. It's a conjunction of all of the things they need.
Q. Okay. So is it your testimony, then, that if an area is so salient that it would be lethal to delta smelt, that those dead fish could nonetheless live and reproduce in that area?
A. You lost me.
Q. Not pointing you to anything in your declaration. Just asking you for your opinion.
A. What? Pardon me?
Q. Let me read that again.

Would it be your testimony, then, in light of the representations that you've made on lines 18 and 19 of your declaration, that let's say there's an area that is so salient that it's lethal to delta smelt.

Given your testimony here in your declaration, from that, would you then conclude that those dead fish could nonetheless live and reproduce in that area? Because you

testified --
A. No, no, I --
Q. -- that --
A. No. I don't understand where you're going with that in the sense that I would claim that they need both biotic and abiotic. They certainly wouldn't be in some place that's too salient for them. Dead fish do not reproduce.
Q. Okay. Thank you. Now let's take a look at paragraph 15 of that same document, if you would for me, please.
I'm sorry, I think I've given myself the wrong paragraph number here. Bear with me just one moment, if you would, please.
A. Yes.
Q. All right. Well, I'm going to skip over this rather than waste the Court's time. Actually, let's get at this a different way. Earlier you testified that you were familiar with the Maunder and Deriso life cycle model; is that correct?
A. A little bit, yeah, I read the stuff earlier on when they had a draft. And I looked at a little bit of the published. But I'm not trying to absorb all the details of what they did.
Q. Are you aware, from the acquaintance that you do have with this document, that those authors found that prey availability has a statistically significant effect on smelt abundance?
A. Yes.
Q. And that given this evidence, the authors concluded that

it seems more likely that smelt are limited by abiotic aspect of their habitat, namely food supply, rather than salinity, which is an abiotic factor.

A. Yes. I recall that.

Q. Now I'd like to refer you, please, sir, to what I believe is in your binder as tab 9. Plaintiffs' Exhibit 9.

A. 9. Okay.

Q. Okay. And this is the MacNally et al. 2009 study; is that right?

A. Yes.

Q. And I believe you testified in your direct that you were familiar with this study; is that right?

A. At some level, yes. It's a very elaborate bit of work, but I have read it, yes.

Q. Are you aware that this study found food supply to have a relatively small effect on delta smelt abundance?

A. I do not recall the conclusions they made. I won't look at that. I do not remember all of the conclusions they made in those regards.

Q. Okay. Well, let's -- let me help you out here. If you could turn to -- it's in the top right of the journal pagination, it's 1425. That's really a tiny font there.

A. Yes, yes, uh-huh.

Q. And there's kind of a web looking thing there.

A. Uh-huh. Yes.

Q. Okay. And have you seen this image before?
A. Yes, yes. I have.
Q. Okay. Is it your understanding, based on this image and the level of familiarity that you have with this study, that the authors found food supply based on what you're seeing here, namely the lines between the boxes.
A. Uh-huh. Yes.
Q. That food supply has a relatively small effect on delta smelt abundance.
A. I'm looking at the two parts where they found stronger or weaker evidence, and looking for lines to delta smelt.
Q. And take your time --
A. That's correct. They do not -- from interpreting what they put in that figure, I don't see any line saying -- well, I'm having to interpret what foods would be for them because I don't know, but what seems to be food, they don't seem to show any --
Q. Okay. Thank you.
A. -- particular lines going to it strongly.
Q. And now let's go to the next exhibit in that binder, if you would for me, please, which has been --
A. Oh.
Q. -- admitted into evidence as Plaintiffs' Exhibit 10.
A. 10. Uh-huh.
Q. And does this appear to be the 2000 study by Thomson or

Thomson et al.?
A. Yes.
Q. And I believe you testified earlier, did you not, that you had reviewed this study?
A. I remember reading it because I remember the Bayesian change point part of it.
Q. Okay.
A. But this one's been a little longer since I looked at it.
Q. Okay. Are you aware that this study found food supply to not have a statistically significant effect on delta smelt abundance?
A. No, I don't recall that.
Q. You don't recall.
A. No. Because as I said, it's been a little longer since I looked at this.
Q. Okay. But it's not your testimony, is it, doctor, that this study demonstrates that there is a link between food supply and delta smelt abundance?
A. Which study?
Q. Thomson, et al., 2010.
A. I don't recall.
Q. But you did testify on your direct examination that you had reviewed this study?
A. I've read it, but not real recently. And all these other things being read.

Q. Okay. Well, let me represent to you, for the purpose of this next question, that, in fact, the Thomson et al. study did not find a statistically significant relationship between food supply and delta smelt abundance.

So with that in mind, would the findings of the MacNally study, which we just looked at with the webs and what I just told you about the Thomson 2010 study, does that essentially make the opposite finding of the Maunder and Deriso life cycle model?

A. Not directly opposite. It did not -- I would say then it did not support what Maunder and Deriso found.

Q. Thank you. Let's go back, if you would, to Plaintiffs' Exhibit 2, please.

A. How do I do this?

Q. I'm sorry, I know it's a lot of flipping. Luckily we don't have too many paper cups up there. I'm going to get some water while you do that.

A. Oh, Exhibit 2. Okay.

Q. Yes, please. And page 7 of that, please.

A. Pardon?

Q. Page 7, if you would, please.

A. Page 7. Okay.

Q. All right. Let me find you the line number here so I can give you the exact quote.

Okay. I've found it. It's at line 13, if you would,

please.
A. Okay.
Q. I'm going to read it to you and then ask you if I've read that into the record correctly. Did you testify there that
"For delta smelt, variation in habitat quality can occur with variability in availability of food, shelter from predators, substrates for spawning, and a large number of physical variables, including salinity, turbidity and temperature."
Have I read that correctly, sir?
A. We're on page?
Q. Page 7, and that's lines 13 through about halfway --
A. Oh, line 13. Okay.
Q. Line 13. Yes.
A. I'm still not getting the same words you --
Q. Okay. Let's go through it together. We're on page 7 at line 13.
A. Yes.
Q. The second word in starts "For delta smelt," comma. That was a question.
A. Huh? I must be on the wrong thing here.
Q. Exhibit 2.
A. This is Exhibit 2?
Q. At the top of that page, do you see a date of June 16th, 2011?

A. Yes.
Q. And -- okay. This may be a page number issue again. I'm sorry. I've done it again.
At the top there, I'm looking at page 9. It's 7 at the bottom right.
A. Yeah, I was -- yeah.
Q. All right. I'm sorry, that's my fault. So we're looking at page 9 for the top numbers and page 7 for the bottom number.
A. Right.
Q. Line 13.
A. Line 13. Oh, yes. Okay.
Q. "For delta smelt," comma. We're there?
A. Yes.
Q. "For delta smelt, variation in habitat quality can occur with variability in availability of food, shelter from predators, substrates for spawning, and a large number of physical variables including salinity, turbidity and temperature."
Have I read that correctly?
A. Yes, yes.
Q. Okay. And in the materials that you prepared for this case, did you, yourself, test whether food, shelter from predators, substrates for spawning or a large number of physical variables vary with X2 during the fall?

A. No.
Q. Okay.
A. This is, of course, in the spirit of a motherhood statement based on the biology I know that all of these things could have an effect.
Q. But you would not be able to tell the Court definitively, based on your own work, whether those factors do, in fact, vary with X2; is that right?
A. I -- that's correct.
Q. Okay. And now, let's go to paragraph 34 of that same document.
A. Paragraph 34?
Q. Paragraph 34. And if you're using the top set of page numbers, it says 16 of 21, please.
A. Yes.
Q. Okay. And in paragraph 34, you opine, do you not, that that correlation or coincidence is not causation?
A. Yeah.
Q. And then I believe you raise this comment in the context of critiquing the use of linked correlations in the Feyrer study; is that correct?
A. Yes. I think so.
Q. But isn't the Maunder and Deriso model also a set of correlations between different data sets?
A. Between different data sets. In a sense, yes, although

these analyses we do with data and models are in and of themselves some of the associations between data.

Q. And given what you said here, at the end of paragraph 34, would you agree, then, that Dr. Deriso's life cycle model has not proven which particular variables cause changes in delta smelt abundance?

A. I would say it provides evidence for that, we never actually prove anything in some strict sense.

Q. Thank you. And now let's go, back again, to your July declaration, which I think is Exhibit 4.

And have you got the tab?

A. Yes. That is, yes.

Q. And please turn to paragraph 17.

A. Okay.

Q. This is page 7 of 49 using the top numbers.

Do you see paragraph 17 there?

A. Yes. Paragraph 17.

Q. And you opine there, Dr. Burnham, do you not, that delta smelt have been found in the Sacramento deep water shipping channel?

A. That's my understanding, yes.

Q. Okay. And that the deep water -- is it your understanding that the deep water shipping channel constitutes delta smelt habitat?

A. From what I'm hearing and reading, yes. If they're there

on a regular basis, yes.
Q. So is it your understanding that where an organism exists is then its habitat?
A. If it can exist there -- if it's actually living there for a while, yes.
Q. But it's possible that an organism could inhabit an area in a transitory fashion --
A. That's what was in the back of my mind. You have to be careful, if they're just moving through an area.
Q. Okay. Like a deer crossing a road?
A. Yeah.
Q. The road is not the habitat.
A. Yes.
Q. Okay. And is there any data on what -- are you aware of any data on what the delta smelt food supply situation is like in the deep water shipping channel?
A. I'm unaware of anything about that.
Q. Do we -- is there data to suggest -- are you aware of data to suggest that there's a permanent year-round population that lives -- of delta smelt that lives all of its life stages in the shipping channel?
A. I am not aware of that, no.
Q. Is it possible that the delta smelt that had been found there come and go there from other parts of the estuary?
A. It's possible, yes.

Q. For this next question, I'd like you to assume that all of the delta smelt in what I would call the main part of the estuary or outside the shipping channel, had been wiped out.

Do we have enough information right now, in the public domain, to know if the smelt that have been found in the shipping channel are a large enough group to persist and avoid extinction?

A. I do not know anything about that.

Q. To your understanding, is the shipping channel a narrow channel?

A. I know the name of it and I know roughly where it is, but I don't know that.

Q. Have you seen it yourself?

A. No, I have not physically seen it.

Q. Is it your understanding that this is a manmade structure?

A. By the virtue of the name of it, yes.

Q. Okay. And by the virtue of the name --

A. And it is --

Q. Would you also --

A. -- very straight.

Q. I would agree with that. Looking here at the map, it appears to be the straightest part of what you see there in blue.

By virtue of the name, would you assume that the Deep Water Shipping Channel is deep water?

A. By virtue of the name, yes.
Q. Okay. Just leave it there.
Dr. Burnham, would a group of delta smelt in that channel, the straight channel there, be more vulnerable to an oil spill or a pesticide leak or something like that from maybe one of the boats in the shipping channel than to a smelt population that lives in an area of the Delta where it can access various parts of the estuary?
A. One might speculate, but I won't speculate. I don't know what the probabilities are if such problems occur.
Q. So just not sure?
A. I'm not sure. I -- this whole thing about delta smelt biology is not my area.
Q. Okay. Fair enough. And in your direct testimony today, you criticized Mr. Feyrer and his study, did you not, for not including data regarding delta smelt presence in the shipping channel, if I remembered that correctly.
A. Yes.
Q. Okay.
A. Probably.
Q. But isn't it true that the smelt presence data for the shipping channel have only recently started to be collected?
A. As far as I know, yes.
Q. Okay. And, in fact, that was after the Feyrer 2007 study was published; is that right?

A. I believe so.
Q. Okay. So you criticized Mr. Feyrer for not using data that did not exist?
A. I don't know the exact word. My critique was that failure to mention anything about the fact that there are -- then become known delta smelt that exist somewhere other than where the data he used were collected.
Q. Just out of curiosity, Dr. Burnham. I know that earlier you testified that you had read the BiOp. And I think you said you had -- you had examined it carefully or something to that effect. Is that -- am I remembering that right?
A. I'd like to clarify that. The BiOp is like 400 pages. I read the parts of it that are relevant to this X2.
Q. Okay. Good enough.
A. And those I have looked at, yes.
Q. Did you read the effects analysis of the BiOp? Or just the X2 part at the end? Do you recall?
A. There was a limited number of pages about X2, so I can't tell you, by virtue of the title you said. I don't recall if I read that or not.
Q. Okay. Have you read any of the biological assessment that was prepared as part of the 2008 biological opinion?
A. I probably looked at some of that at one time. But that was a quick look over, not a focused look at that.
Q. Okay. And that's an even bigger document, I will

represent for the record.

Okay. Dr. Burnham, when we were introduced to you today, you testified that you had published many papers and journals before; is that right?

A. Yes.

Q. Okay. And as part of that, are you aware that there's a peer review process that happens generally?

A. Oh, yes, yes.

Q. Can you explain for us briefly what the purpose of that peer review process is?

A. It is to attempt, to the extent possible, to maintain the quality of things that are published, to see that they are not on the face of it erroneous, to see that they have not been previously published somewhere without knowing about it. And also, actually, to see whether or not a peer reading it can understand it or whether it's written in such a difficult to understand manner that it should be revised and clarified.

Q. Okay.

A. But the key thing was, indeed, correctness of what is done.

Q. Okay. And let me back up for a second, Dr. Burnham.

Your testimony today focused on populations of delta smelt; is that right?

A. Yes. In -- well, focused on the X2 action and, in fact, from my point of view, I was looking at evidence -- what other

people have done in terms of evidence about what the effect may or may not be of the X2 action on the population of delta smelt. That was my focus.

Q. Okay.

A. And so it's what other people have done.

Q. Okay. But you've offered no evidence pertaining to adverse modification of critical habitat; is that right?

A. No.

Q. That's not correct?

A. Wait a minute.

Q. I'm sorry. Not trying to trip you up here. So let me put it to you in a different way.

Have you offered evidence regarding adverse modification to critical habitat?

A. No, I have offered no such evidence and I would think in terms of I have offered no evidence. I have commented on published stuff and other people's evidence. And initially the issue was, people didn't understand the statistic, is whether that was reasonable or not.

Q. Okay. And, in fact, the phrase "critical habitat" is not used in either of your declarations; is that --

A. I don't --

Q. -- correct, to the best of your recollection?

A. To the best of my recollection, I suppose, I don't know.

Q. Okay. And earlier you testified that you were familiar

with the Kimmerer 2009 study; do you remember that?
A. Yes, I read it at one time. I haven't looked at it in -- real recently.
Q. Okay. Did you -- back up here. Is it your understanding, based on that review, that Dr. Kimmerer applied a generalized additive modeling approach?
A. Yes.
Q. And did he apply that approach to presence and absence data for the delta smelt?
A. My recollection is he looked at actual numbers as well. I don't remember everything he looked at. But I think he looked at the actual numbers as well.
Q. Okay. So both presence and absence. And also fish count; is that --
A. Yeah, it's a mean fish count.
Q. So he went to both of those data sets.
A. I think so.
Q. Using the generalized additive modeling.
A. Yes.
Q. And do you recall what he concluded about the X2 habitat relationship? Based on those two analyses?
A. That was something that caught my attention. And my recollection is that he concluded X2 -- repeat the question?
Q. Sure thing. What did Dr. Kimmerer conclude about the X2 -- the relationship, rather, between X2 and habitat, using

his generalized additive modeling analysis of the presence and absence and the fish counts?

A. That I don't remember. I was remembering what he concluded about X2 in relation to abundance.

Q. Okay. I'm going to hand you his study. Or it may already be up there. Hang on just one second.

This is actually in there as Plaintiffs' Exhibit 11, I'm told. So let's verify that.

MR. GONZALEZ: It is.

MR. EDDY: Thank you.

Q. So please go to Exhibit 11 for me, if you would.

A. Okay. Yes.

Q. And does that appear to be the Kimmerer 2009 study?

A. Yes.

Q. Okay. And turn now, if you would, for me, please, to -- in the journal pagination, it looks like it's -- where are the page numbers in this thing? I don't see any journal page numbers here. They must have been blacked out. One, two, three, four, five, six, seven -- it's the seventh page in. My copy doesn't have the journal page number for some reason. And on the left, once we arrive on the same page, you should see two images there. Two kind of columns. May I approach the witness, Your Honor?

THE COURT: Yes, you may.

BY MR. EDDY:

Q. All right. Can you read, just to yourself is fine, the -- on the right-hand column, that very first paragraph that begins "bootstrap replicates." Do you see that there --
A. Oh, yes.
Q. -- doctor?

Okay. Can you read that just to yourself and then I'm going to ask you some questions about it.

MR. LEE: Your Honor, I can't really tell what page --

MR. EDDY: I'm sorry.

MR. LEE: If you can put it on the Elmo and perhaps those of us that have copies, we can identify which page you're reading from.

MR. EDDY: Thank you, Mr. Lee.

THE COURT: It's the page that says "Springer" in the lower right-hand corner. If you count in seven pages, the subject is "Estuaries & Coasts," C-O-A-S-T-S. Coasts. And then it's the right column. It's the first paragraph in the right column. It's a two-column printed page.

MR. EDDY: Thank you, Your Honor. And thank you, Mr. Lee. It's this page with the image there on the left.

THE WITNESS: Okay.

MR. EDDY: Let me give plaintiffs' counsel a moment to make sure that we've all got it.

MR. LEE: Okay.

MR. EDDY: Thanks everyone.
Q. And Dr. Burnham, if you could let us know when you've had a chance to look that over. And once you're ready to discuss it, I'll ask you a couple of questions about it.
A. Okay.
Q. Ready?
A. Yes.
Q. Okay. What did Dr. Kimmerer conclude about the relationship between X2 and habitat?
A. I don't know what he concluded on here, other than the bootstrap samples and of the minor effects on the calculated values of H, I assume that's habitat area.
Q. Okay. Let me put it to you this way. Can you distill for us laypeople what you've just read there in that paragraph?
A. Well, you have -- the bootstrap is taking a sub-sample of the data of the same size. So it's a re-sampling thing. And then he was using those to look at fitting the resource selection function to each sample and saying that they were getting fairly similar results to the original data except for the variable peak values.
Q. Okay.
A. Now, I -- but I haven't, you know, read the whole context of what's going on here.
Q. Okay. Fair enough.
A. And looked at it in a little while.

Q. Let's leave it there.

And earlier you described the purpose of the peer review process for us. And I thank you for that. Your declarations have offered a criticism of the Feyrer 2011 study; is that right?

A. Yes.

Q. But that paper was accepted for publication at a peer review journal; is that right?

A. Yes.

Q. Dr. Burnham, is it common, in the scientific literature, for one scientist to respond to another's work by way of a written response or maybe a letter that's then published in that same journal?

A. It's not real common, but it happens.

Q. It happens. Have you ever engaged in that process?

A. Yes. Rarely.

Q. And then sometimes the original author will get a chance to reply?

A. Sometimes.

Q. That sort of thing. And that could be used to raise a point that's in dispute?

A. Pardon?

Q. And that process could be used to raise a point that might be in dispute between two scientists in the field.

A. Yes.

Q. Maybe where one scientist disagrees with the methodology or an outcome.
A. Yes.
Q. Are you aware of any scientist having written to the journal or submitted a response paper to that journal to take issue with the Feyrer, et al. 2007 paper?
A. No.
Q. Or with the Feyrer et al. 2011 paper?
A. No, nothing comes to mind.
Q. Okay. Let's go, if you would, to your June declaration again. That's Exhibit 2 in the tabs there.
A. Getting there. Okay.
Q. And if you would, please, to paragraph 35. Have you found it?
A. Oh, yes, yes.
Q. Okay. Thank you. In the first line there, you state, do you not, that "In my review of Feyrer (2010) I was struck by his apparent unwillingness to test the effect of X2 on abundance." Have I read that correctly?
A. Yes.
Q. When we were talking a minute ago about this sort of scholarly debate that happens in these journals with this response, rebuttal process that happens from time to time, is it common that one scientist would openly question the motives of another scientist?

A. Probably uncommon.
Q. Can you think of any examples in the scientific literature where, when one scientist critiques another paper where the author chose not to use a certain variable, that the scientist accused the author of having an apparent unwillingness to test that variable?
A. I don't recall any.
Q. In your scientific work, do you always use the adversarial tone that we see in the declarations that you filed in this case?
A. No.
MR. EDDY: That's all I have. Thank you, Dr. Burnham.
THE COURT: Is there a reason you used it, if you did, in this case?
THE WITNESS: Huh? Pardon?
THE COURT: The question assumes something that hasn't been established. Did you use an adversarial tone in your declaration?
THE WITNESS: I didn't particularly mean it to be that way.
THE COURT: All right. It assumed a fact not in evidence.
And so the next question is: If you did -- you didn't intend it, but if it could be interpreted that way, was

there a reason for it?

THE WITNESS: No. Just to emphasize that this type of analysis that I would look for was not, in fact, found in his work.

THE COURT: Thank you.

MR. EDDY: May I ask one quick followup question, Your Honor?

THE COURT: Yes, you may.

BY MR. EDDY:

Q. When you opined that Mr. Feyrer was unwilling to test the effect of fall X2 on abundance, had you asked him about his willingness to do that?

A. No.

MR. EDDY: Thank you.

THE COURT: Cross-examination. Mr. Torgun.

MR. TORGUN: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. TORGUN:

Q. Good afternoon, Dr. Burnham. My name is George Torgun, I'm counsel for the defendant intervenors in this case, National Resource Defense Council and The Bay Institute.

It's been stated earlier that you were asked, as part of this litigation, to determine whether enjoining X2 would harm the delta smelt; is that correct?

A. Yes.

Q. And this is the case even though, as you stated earlier, this whole thing about delta smelt biology is not your area; is that correct?
A. That is correct.
Q. And have you published any peer reviewed articles which show the relationship between enjoining X2 and harm on the delta smelt?
A. No, I have not.
Q. As you stated earlier, you've offered no evidence of your own on this topic; is that correct?
A. That is correct.
Q. When were you asked by the plaintiffs in this case to conduct a review of the relationship between X2 and harm to the delta smelt?
A. That was this year in the spring, that was perhaps four months ago, or something like that.
Q. So it's safe to say that your criticism of Mr. Feyrer's articles were not presented to the Fish & Wildlife Service prior to December of 2008 or to this Court prior to December of 2010; correct?
A. Yes.
Q. And the articles that you've discussed in your declarations by Mr. Feyrer, they have been published in peer reviewed scientific journals; correct?
A. I think one of them was. One of them -- I think -- I lose

track of time. You said it was 2010, yes, because we're in 2011. So yes, I think so.

Q. Can you turn to your June declaration, which is Plaintiffs' Exhibit 2 in the binder. June 16th.

A. It is -- pardon me? Which one?

Q. Exhibit 2 in the binder. Your declaration.

A. Yes, that's the one I'm on. Yes.

Q. Okay. Good. On paragraph 6 of that declaration, you state that there is, quote, "No support for the hypothesis that manipulation of the location of X2 will provide any benefit to the delta smelt."

Did I read that correctly?

A. Yes.

Q. And I think you've testified earlier that you haven't given an opinion on whether the manipulation of X2 would affect delta smelt's critical habitat; is that right?

A. Need to clarify. I have not expressed an opinion in some sense on my own. What I've expressed is looking at the work of other people and whether they found evidence for or against the issue. And I was looking to see if, from the standpoint of the client, whether I felt their work was credible. And so then I expressed -- I really reflect what other people have published.

Q. Well, do you -- have you determined, in your declarations, that the fall X2 action will provide no benefit for the

recovery of the delta smelt?
A. As far as I can see from the evidential data and work, there is no evidence in my mind that it will benefit.
Q. And if that benefit that you're talking about in this paragraph includes benefit to the delta smelt from increasing habitat and also allowing for the recovery of the species?
A. I need to be more careful. I am not focusing on habitat per se in that I'm focusing on numbers. Would some action we take causally -- is there evidence it would causally lead to an increase in numbers?
Q. Okay. You stated earlier that you have reviewed at least portions of the biological opinion in this case.
A. Yes.
Q. From your review, do you know what the objective, the stated objective of the fall X2 action is?
A. The first objective, in terms of managing where X2 is located. But then the reason for that is that there -- the belief that this might lead to a higher numbers of delta smelt in subsequent years.
Q. Can you find the biological opinion, which I believe is Plaintiffs' Exhibit 1, in that binder. And then can you turn to page -- the BiOp page 369.
A. 3 --
Q. That's the number at the bottom, not at the top.
A. Okay. I am almost there. Which page number?

Q. 369 at the bottom. And at the top, it's page 000384. And that's the administrative record page.
A. Ah. Yes.
Q. You see the caption at the top there is entitled "Action 4 Estuarine Habitat During Fall."
A. Oh, yes.
Q. And can you read what that first sentence after the word "Objective" states?
A. "Improve fall habitat for delta smelt by managing X2 through increasing Delta outflow during fall when the preceding water year was wetter than normal."
Q. Thank you. And do you know if the fall X2 action is also intended to provide for the recovery of the delta smelt?
A. I'm a little unclear on the question.
Q. Are you familiar with the term "recovery"?
A. Yes, oh, yes.
Q. So my question is whether the biological opinion intended this action, the fall X2 action, to provide for the recovery of the delta smelt?
A. Oh, yeah, I believe that it intended it, yes.
Q. Okay. Thank you. I think in your testimony here today, you've stated that you've considered a number of different articles, including certain pages from the biological opinion, Mr. Feyrer's articles, the Deriso Maunder article, Thomson MacNally 2009 articles. Is that correct?

A. Yes.
Q. Who instructed you to consider those sources of information?
A. Pardon me?
Q. Who instructed you to consider those sources of information?
A. Morrison and Foerster on behalf of Metropolitan.
Q. And you had stated earlier you hadn't considered studies about -- regarding salinity and the impact of salinity on delta smelt?
A. What was the question?
Q. You stated earlier you did not separately consider studies regarding salinity impacts on delta smelt.
A. Yeah, it was the "did not" part I didn't quite hear. Yeah, I didn't. I have not looked at those sorts of studies.
Q. And have you looked at the Sommer 2011 study that was attached to the declaration of Mr. Feyrer in this case that found a strong association between delta smelt distribution and X2 during fall?
A. I don't remember that one.
Q. In your opinion, did the biological opinion rely exclusively on Mr. Feyrer's work to justify the fall X2 action?
A. It seemed to. That was my impression.
Q. So do you know if the biological opinion relied on any

other published studies to support the fall X2 action?
A. At this point, I do not remember. Since that was one of the earlier things I read, and I haven't really gone back to it lately.
Q. Do you remember if the -- if the biological opinion relied on the work published by Dr. Bennett in 2005 and Nobriga 2008 that linked habitat alteration to the decline of the delta smelt?
A. I honestly don't remember that.
Q. Can you turn to the biological opinion again, which is Plaintiffs' 1, and hopefully you're already there, on page 374.
A. I am there.
Q. And this is the same section we were referring to, correct, about -- regarding Action 4?
A. Yes.
Q. Starting on 369. And do you see on page 374, the final paragraph on that page.

> "However, the following is further complications because there are several lines of published peer reviewed scientific research that link habitat alteration to the decline of delta smelt (Bennett 2005, Feyrer et al. 2007, Nobriga et al. 2008)."

A. Yes.
Q. Did I read that correctly?

A. Yes.
Q. Now, can you turn back to your declaration, which is Plaintiffs' Exhibit 2.
A. Uh-huh.
Q. Let's move ahead to paragraph 20.
A. Okay.
Q. In the second sentence of that paragraph, you state that "Mr. Feyrer suggested manipulating the location of X2 as a method of managing salinity levels in the Delta."
Is that correct?
A. That's what it says, yes.
Q. Were you suggesting in that sentence that Mr. Feyrer himself came up with the idea of using X2 as a method for controlling salinity in the Delta?
A. I don't think I -- I would not interpret it that way.
Q. Okay. Is the use of X2, as a management tool, based on a number of pre-existing peer reviewed and published scientific articles that show a relationship between the abundance or survival of Delta species and flow entering the estuary as indexed by X2?
A. Pardon me?
Q. Restate -- I'll restate the question?
A. Yes.
Q. Is the use of X2 as a management tool, based on a number of existing peer reviewed and published scientific articles,

that show a relationship between the abundance or survival of Delta species and flow entering the estuary as indexed by X2?

MR. GONZALEZ: Your Honor, I'm going to object that this assumes facts not in evidence. Unless it's posed as a hypothetical. I'm not sure what article he's referring to. It's also vague.

THE COURT: All right. There are two different lines of objection. As to the lack of foundation, the objection is sustained. As to the, if you will, assuming of the premises that are in the articles to form the basis for the witness' opinion, he's entitled to ask him whether he agrees or disagrees with other expert opinions without violating any rule of evidence.

And so let's break the question down, if you would, please, Mr. Torgun, the foundation first and then you can ask him his opinion.

MR. TORGUN: If I can approach the witness, Your Honor.

THE COURT: You may.

MR. TORGUN: This is an exhibit that's previously been marked as Defendants' 586, and it's the Feyrer 2007 article. And I believe it's already been distributed. It was up there during the previous witness' testimony.

Q. Is this an article you've considered in your declarations that you've filed in this case, Dr. Burnham?

A. It looks familiar enough to me that I do believe I have seen it before. It's probably one that I read, yes.
Q. If you'll turn to the second page of that article, which the journal page is 724.
A. Yes, uh-huh. Yep.
Q. And in the column on the right, and the last full paragraph, which starts "similar to most estuaries."
A. Yes.
Q. The second sentence there states, "In particular, the abundance or survival of many fishes and invertebrates exhibits a strong relationship with flow entering the estuary, as indexed by the position of the two percent isohaline (Jassby et al. 1995; Kimmerer 2002). This index, termed X2, is defined as the distance (km) from the Golden Gate Bridge to the location in the estuary where the mean bottom salinity hits two percent."
Did I read that correctly?
A. Yes.
Q. I'd like to move along in your declaration, which is Exhibit 2 again, to paragraph 35.
A. Okay.
Q. And this discusses the Kimmerer 2009 article, which you've been testifying about here today. In that paragraph, you note that Dr. Kimmerer performed a very similar analysis of habitat

logging of the delta smelt as Mr. Feyrer did; is that correct?
A. Um, that's paragraph 35?
Q. Yes. And that's on the second page of that paragraph.
A. Oh, right.
Q. 17 of 21 at the top.
A. Okay. What sentence?
Q. It starts with, "In another recent paper." On the second line of page 17 of 21.
A. Oh, there. I found it.
Q. And that in that sentence, you simply note that "Dr. Kimmerer has performed a very similar analysis of the habitat volume of the Delta species, including the delta smelt, similar to Mr. Feyrer's analysis."
A. Yes.
Q. Now, is it your contention that Dr. Kimmerer -- and you state he -- you state later on in that -- sorry. Strike that.
You state later on that "Dr. Kimmerer directly considered the relationship between X2 and abundance and his results were clear."
And you quote the article, I believe, here, which was up on the screen earlier. And the quote is that "Abundance of delta smelt did not vary with X2."
A. Yes.
Q. Dr. Kimmerer, in his 2009 paper, was he considering fall X2?

A. I -- I don't -- I don't know. I don't remember. I know he considered also spring X2. I think he was considering more than fall X2, but I don't know what all the results were right now with respect to either of those things.
Q. And do you recall if Mr. Feyrer was considering fall X2 in his study?
A. Yes, he was considering that.
Q. Can you turn to Plaintiffs' Exhibit 11, which I believe is the Kimmerer 2009 article.
A. Okay.
Q. And the third page of that article is the journal page 377.
A. Oh. What? This is Exhibit 11?
Q. Should be Plaintiffs' Exhibit 11. It's the Kimmerer 2009 article.
A. Yes. Well, I get to a third page, but again, this doesn't have page numbers.
Q. At the top, there should be a very -- I don't know if it shows up in your copy, in my copy it's 377 --
A. Oh, mine does not have it.
Q. And there's a -- it's the third page. And there's an italicized kind of heading that says "Abundance-X2 Relationships."
A. Yes.
Q. Okay. A few sentences down, there is a sentence that

starts with the words "The log of."
A. Oh, okay, "The log of the" --
Q. Correct. That sentence states, "The log of the annual abundance index was related to X2 averaged over several spring months when each species is likely to be most vulnerable to fresh water flow effects." Did I read that correctly?
A. Yes.
Q. And based on that, does that sentence tell you whether Dr. Kimmerer considered spring X2 or fall X2?
A. Well, spring -- well, he at least considered spring X2.
Q. With regard to his findings about the abundance and X2 relationships?
A. In there he was talking about it, yes.
Q. Now, with regard to the delta smelt, do you know any reason why the movement of spring X2 might have a different impact on the species compared to the movement of fall X2?
A. No, no, I don't know any of that sort of thing.
Q. Well, would you agree, Dr. Burnham, that for species like the delta smelt, which is an annual species, which everyone here concedes is at record low numbers, that it's important to protect all life stages of that species?
A. All life stages have to be considered, sure.
Q. Can you find now your reply declaration, which is Plaintiffs' Exhibit 4. And turn to paragraph 13.

A. Paragraph 13. All right. Yes.
Q. To start off that paragraph, you're talking about Mr. Feyrer's claim about abiotic habitat -- and you state that his claim that abiotic habitat is somehow necessarily more important than biotic factors to the survival of the species. Skipping down to your conclusion about that. You state that there is simply no scientific support for this position.
A. As far as I know. I have not -- yes, as far as I know.
Q. And you state, Dr. Burnham, you considered the Thomson 2010 paper; correct?
A. Pardon?
Q. In your declaration, you -- I believe you stated that you considered the Thomson 2010 paper.
A. Yes. Was that on Bayesian change point analysis?
Q. That's the one.
A. Yes.
Q. If you flip to Plaintiffs' Exhibit 10, you can find the Thomson paper.
A. Okay.
Q. If you turn to journal page 1445 or the page at the top, page 16 of 19. If you can find that page.
A. Well, page -- journal page 1445?
Q. Right.
A. Yes.
Q. And the first sentence on that page states, "The variable

selection results suggest that at the estuary scale, abiotic factors (water clarity, X2, exports) may have more influence on interannual variation and abundances of the four species than do biotic variables."

Did I read that correctly?

A. Yes.

Q. And was the delta smelt one of the four species considered in this paper?

A. I believe so.

MR. TORGUN: Okay. Thank you, Dr. Burnham. That's all I have.

THE COURT: Redirect.

MR. GONZALEZ: We have nothing more, Your Honor.

THE COURT: Mr. Eddy?

MR. EDDY: No, Your Honor. Thank you.

THE COURT: May this witness be excused?

MR. GONZALEZ: Yes, Your Honor.

THE COURT: Thank you, Dr. Burnham. You may step down. You are excused.

Do you have another witness?

MR. WILKINSON: Your Honor, we can start Dr. Hanson.

THE COURT: Yes, let's start him. We have ten minutes.

MR. WILKINSON: Okay. Call Dr. Charles Hanson to the

stand.

CHARLES HOWARD HANSON,

called as a witness on behalf of the SWC Plaintiffs, having been first duly sworn, testified as follows:

THE CLERK: Please have a seat. And when you do, state your full name for the record and spell your last.

THE WITNESS: My name is Charles Howard Hanson, H-A-N-S-O-N.

THE COURT: You may proceed.

DIRECT EXAMINATION

BY MR. WILKINSON:

Q. Good afternoon, Dr. Hanson, I'd like to begin by asking. Have you submitted declarations in this proceeding?

A. Yes, I have.

Q. And have you testified previously as an expert in fisheries biology in litigating -- in litigation relating to the delta smelt?

A. Yes, I've been qualified as a fisheries expert, both in the delta smelt proceedings as well as salmonids proceedings.

Q. Would you briefly describe your educational background, please.

A. I have a bachelors and masters in fisheries biology from the University of Washington. I studied environmental engineering at Johns Hopkins and I have a Ph.D. in fisheries and ecology from the University of California at Davis.

Q. Would you also please give the Court just a brief description of your involvement historically with delta smelt issues?

A. I've been working on Delta issues since the mid 1970s involving a variety of native and non-native fishery studies. Evaluation of the environmental effects of operation of cooling water systems on various fish populations. Reservoir operations. Instream flows, habitat, entrainment issues at a variety of locations.

I've been a member of the Delta fish -- the Native Delta Fish Recovery Team for the US Fish & Wildlife Service dealing with delta smelt, as well as a member of the National Marine Fisheries Service Native Delta -- or the Salmonid Recovery Team for Central Valley Salmonids.

Q. Dr. Hanson, was a statement of your qualifications previously provided in this litigation as an attachment to document 344?

A. Yes, it was.

Q. Now, are you familiar with the life history of the delta smelt and the factors that affect their geographic distribution, their survival, their reproduction and their food availability within the Bay Delta Estuary?

A. Yes, I am.

Q. Are you familiar with the surveys that have been conducted by the California Department of Fish & Game regarding the

delta smelt?
A. I am familiar with the Fish & Game surveys.
Q. Are you also familiar, Dr. Hanson, with the fall X2 measure that the Fish & Wildlife Service has adopted as Component 3 of the reasonable and prudent alternative of the 2008 OCAP biological opinion?
A. Yes, I am familiar with the fall X2 action.
Q. Would you explain your understanding of how the fall X2 measure is intended to work.
A. My understanding is that in those years that were characterized as either wet or above normal, based on precipitation during the winter and spring, that the biological opinion prescribes that the location of the two part per thousand isohaline, referred to as X2, be maintained at specific locations within the Suisun Bay area. In wet years, the maintenance of the X2 line during September and October is at kilometer 74 or further to the west. And during above normal water years, it's maintained at kilometer -- I believe it's 82 in September and October.
Q. And now, is it your understanding that 2011 is a wet water year?
A. 2011 is a wet water year.
Q. And is it also your understanding, Dr. Hanson, that the Fish & Wildlife Service intends to apply fall X2 to the operations of the State Water Project and the Central Valley

Project beginning in September of this year?
A. That is my understanding.
Q. Were you asked to provide declaration testimony in connection with the pending motion for preliminary injunction?
A. Yes, I was.
Q. Would you describe for the Court what you were asked to do?
A. What I was asked to do was to review the biological opinion, focusing on the fall X2 action. Review the supporting documents, the articles by Mr. Feyrer, et al. in 2007 as well as 2010. Review the declarations of other parties in the proceedings.

And to use information that's available from the Department of Fish & Game fishery surveys to examine the assumed relationships where the hypothesized mechanisms through which maintenance of fall X2 might affect various life history attributes of delta smelt.

Specifically focusing on how fall X2 might affect the geographic distribution of delta smelt in the fall, the survival of pre-spawning delta smelt in the fall, the reproduction of delta smelt the following spring and food availability for delta smelt.
Q. Was it your understanding that each of the factors you've described, geographic distribution, survival, reproduction and food availability, bear upon the abundance of delta smelt?

A. Those are factors that affect the vital rates of delta smelt. They affect the population dynamics of the smelt and ultimately would be expected to affect the abundance of delta smelt.

Q. Were the results of the analyses that you undertook, Dr. Hanson, set forth in declarations that were presented in the Court?

A. Yes, they were.

Q. I'd like to show you -- or actually, I think you have it in your binder, Dr. Hanson, a copy of your initial declaration marked as State Water Contractors -- are we using plaintiffs or do you want it divided by individual plaintiff, Your Honor?

THE COURT: Well, you have a separate exhibit binder. And this simply provides direct examination exhibits for Dr. Hanson. You have numbered these in the 100 series. And as long as no other plaintiff has designated in the 100 series, we can simply refer to them as Plaintiffs' 100 through 117.

MR. WILKINSON: All right. Thank you, Your Honor.

Q. Dr. Hanson, you have Plaintiffs' Exhibit 100 as part of your binder; do you not?

A. Yes, I do.

Q. Do you recognize the document?

A. Yes.

Q. Is that a copy of your initial declaration?

A. That is a copy of the declaration that I filed in June of

2011.
Q. Did you prepare that declaration yourself?
A. Yes, I did.
Q. Are there any corrections that you would like to make to that declaration, Dr. Hanson?
A. There are. There are three corrections that I'd like to enter. The first appears on page 29, paragraph 34. Line 19. The word "biotic" --
THE COURT: Hang on a second, if you don't mind. Let me get there. All right. Page 29?
THE WITNESS: Page 29, paragraph 34.
THE COURT: It's easier to find it by paragraph.
MR. WILKINSON: Line 19, Your Honor.
THE COURT: Yes. I can only turn the pages as fast as they will permit. Manual dexterity notwithstanding.
All right. Page 29, paragraph 34 at line 12. So we're at line 19. And "those biotic elements"?
THE WITNESS: Yes. That should read "those abiotic elements."
THE COURT: All right.
THE WITNESS: The second correction occurs with respect to the regression equation presented on Exhibit 2f.
THE COURT: Wait a second. You mean -- is it Exhibit 2f to this declaration?
THE WITNESS: Yes, it is, Your Honor.

MR. WILKINSON: It would be on page 43, Your Honor, near the end of the document.

THE COURT: Bear with me.

MR. WILKINSON: I'm using the page numbers --

THE COURT: I'm on page 43. All right. And it's a Slopes (linear) from delta smelt abundance point estimates.

THE WITNESS: Correct.

THE COURT: All right. I'm there.

THE WITNESS: The regression equation should be corrected to read y equals minus 12.002x plus 686.74 with an R-squared equal 0.0607. The graph itself is correct, but the regression equation was incorrect.

And I have a third correction, which is virtually identical. That appears on Exhibit 2-I.

THE COURT: And that's page?

MR. WILKINSON: That would be page 46, Your Honor.

THE COURT: All right. And there?

THE WITNESS: And the regression equation for this graph should read y equals minus 0.0915x plus --

THE COURT: 0.0915x?

THE WITNESS: X. Plus.

THE COURT: Plus.

THE WITNESS: 149.42 with an R-squared equals 0.1191.

THE COURT: All right.

MR. WILKINSON:

Q. Again, Dr. Hanson, does the graph remain the same?
A. The graph remains the same, simply the regression equation needed to be updated.

MR. WILKINSON: Your Honor, with those corrections, we will offer Exhibit 100 into evidence.

THE COURT: Any objection?

MR. EDDY: No objection, Your Honor.

THE COURT: Exhibit 100 is received in evidence.

(SWC Plaintiffs' Exhibit 100 was received.)

THE COURT: All right. We have reached the end of our court day. Are we on schedule?

MR. WILKINSON: I think we're pretty close, Your Honor. Yes.

THE COURT: All right. Is there anything further before we recess?

We are in recess until 8:30 a.m. Have a good evening.

(The proceedings were concluded at 5:05 p.m.)

I, KAREN HOOVEN, Official Reporter, do hereby certify that the foregoing transcript as true and correct.

DATED: 09/02/2011

/s/ Karen Hooven
KAREN HOOVEN, RMR-CRR