UNITED STATES DISTRICT COURT

EASTERN DISTRICT OF CALIFORNIA

HON. OLIVER W. WANGER, JUDGE

NATURAL RESOURCES DEFENSE COUNCIL, et al., Plaintiffs,	No. 05-CV-1207-OWW
vs.	HEARING RE INTERIM REMEDIES DAY 6
DIRK KEMPTHORNE, Secretary, U.S. Department of the Interior, et al. Defendants.	

Fresno, California Thursday, August 30, 2007

REPORTER'S TRANSCRIPT OF PROCEEDINGS

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Reported by: KAREN LOPEZ, Official Court Reporter

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Thursday, August 30, 2007 Fresno, California
8:27 a.m.

THE COURT: Good morning, ladies and gentlemen. Please be seated.

We're back on the record in NRDC versus Kempthorne. We're going to resume the testimony of Dr. Hanson. And during the time before we entered court, the court reporter notified me that the parties have inquired of her about the transcript for references during closing arguments.

And what I will do for this proceeding is, because of the quality of her real time reporting, I'm going to find that her transcript, as she will produce it, is sufficiently accurate and reliable that you may use it for the purposes, if you wish to, for quoting during your arguments recognizing that it will not be the official certified transcript because the shortness of time. She doesn't physically have enough hours to get the transcript completed.

Secondly, on the subject of the time remaining in our hearing, this is our seventh day and I want all counsel to be cognizant of the fact that we still have at least one, if not two witnesses. And so I'm hoping that you will all be mindful of that and the questioning will be conscious of the fact that somebody may run out of time. And my hope is that that does not happen. With that, Mr. Wilkinson.

MR. WILKINSON: Yes, Your Honor. Several of us have

provided declarations to the plaintiffs and we are trying to schedule people to be here. It would be helpful for us to know if there are any of those declarants that the plaintiffs do not wish to depose -- not depose, but to cross-examine so that we can tell them that they don't have to appear. It would be helpful for us to know that.

MS. POOLE: Good morning, Your Honor. Kate Poole for plaintiffs.

THE COURT: Good morning.

MS. POOLE: Your Honor, those declarations that we received yesterday, which had been modified by the intervenors, presents a total of eight potential new witnesses whose declarations they want to submit into evidence. And after reviewing them, we realized that we had already objected to seven of eight of those witnesses as presenting irrelevant economic testimony. And the redacted versions appear to continue to provide that objectionable evidence. So we do intend to file written objections to that.

But in the event that Your Honor allows that evidence in, we would like the opportunity to present the declarations of our economic and water supply experts into evidence. Those would be the declarations of Dr. Gleick, Professor Hanneman and Mr. Rosekrans. However, we realize that puts all of us in the very untenable situation of 11 potential new witnesses to complete before tomorrow in addition to the three we have

scheduled.

So we'd like to propose an alternative approach, which would allow the intervenors to admit the declarations that they've identified yesterday, we would admit our responsive declarations and all the parties would waive cross and simply file written objections to those declarations.

THE COURT: That sounds reasonable to me.

MR. WILKINSON: I think it's reasonable too. It certainly saves the Court's time and it saves travel time for the witnesses. I think they would appreciate that.

THE COURT: Yes. And at this point, as long as you can draw my attention to the real issues of controversy. I did rule last week on the objections and I have limited the economic testimony to, in effect, an overall showing of hardship.

And I have indicated that strictly under the ESA, that the objection that economic, as opposed to the species extinction hardships are not really balanced because of the law's preference for protection of the species.

But I still want to see overall what the parties say the results of any remedy that would be imposed will be with some reasonable certainty. And so I have sustained in part those objections as I've just described.

MR. O'HANLON: Your Honor, this is Daniel O'Hanlon. Of the declarations that Ms. Poole identified, one of them,

Dr. Hanneman, is from an economist. We did submit declarations from an economist, Dr. McKusick. We did not offer them yesterday in light of the Court's instruction that it didn't want to hear economic evidence.

So the proposal sounds fine to me, with that caveat that if the Court were going to consider Dr. Hanneman's declaration, which is purely economic information, we would like to --

THE COURT: All right. Well, I haven't read it, so I'm not conversant with its substance. It may cover other subjects. If it's strictly economics in terms of like present valuing or talking about the amount of any claimed damages and how that would be calculated or projected, then we probably don't need it. But I'm going to leave that to the parties. And if that's still specifically an issue, I'll take it up at 1:30 today.

MR. O'HANLON: All right. Thank you, Your Honor.

MR. LEE: Your Honor, Clifford Lee for the Department of Water Resources. Two matters. First of all, I would appreciate it if the plaintiffs could identify the declaration that they are not objecting to. The specific declarant. That would be one thing that we'd like to know.

And secondly, the plaintiffs now, for the first time, have indicated that they are going to be introducing Mr. Gleick's declaration, which was part of their initial set of

submittals. Mr. Gleick spoke about the possibility of water conservation and the availability of water conservation.

In formulating the declarations that we were introducing, we were assuming that that issue was not going to be on the table and the plaintiffs have not identified, until today, what declarations they were putting in. We have a responding declaration solely on the issue of the feasibility of conservation in the next year by Mr. Alemi and that would be -- Manucher Alemi, that would be document 431.

And if the plaintiffs plan to submit Mr. Gleick's declaration, we would like to submit Mr. Alemi's declaration as well. That being the case, then we would forego cross-examination also subject to objections. But we would like to know --

THE COURT: And you would redact it so the only thing we'd be seeing is the water conservation issue.

MR. LEE: That is all that the Alemi declaration talks about. Has nothing to do with water costs.

THE COURT: Are there any other subjects that are addressed by the Gleick declaration, Ms. Poole, besides water conservation?

MS. POOLE: The Gleick declaration is simply addressing efficiency measures and conservation measures.

THE COURT: Seems to me, then, that those are sufficiently narrow in scope that they would be addressed

directly at each other. And so is there any objection to this Alemi --

MS. POOLE: Your Honor, I'd like to take another look at it and if we have any objection, you can come --

THE COURT: You may.

MS. POOLE: Assert them at 1:30.

MR. WILKINSON: Your Honor, there's one other declaration that we did not offer, again, because we did not think that the Gleick declaration was going to be in. But the declaration of Steven Arakawa from the Metropolitan Water District, the largest state water contractor, also deals with that subject. So if Mr. Gleick's declaration is coming in, we would like the to have the opportunity to add that additional declaration.

THE COURT: Here's what I would like you to do. Please let us try to not make this cumulative.

MR. WILKINSON: I understand.

THE COURT: His point's strictly on a different subject, a different impact as to what would be the consequence of any remedies that are imposed. And then hopefully Dr. Gleick responds in a more universal way. And so we'll have that narrowly focused. Just the issues that they raise and the rest of it we don't need.

MR. WILKINSON: It would be helpful to us, I think, to also be able to see how these declarations of Dr. Gleick

and Mr. Rosekrans and -- I've forgotten the third one. Hanneman. How those are redacted so that we can see what we need to respond to.

MS. POOLE: We have not currently redacted them at this time because of -- because we were not sure whether this approach would be acceptable.

THE COURT: Yes, it is. And hopefully they can be redacted at least by sometime today so that they can be delivered to the other side. And I want you to do the same thing --

MR. WILKINSON: Right.

THE COURT: -- in getting your declarations to the plaintiffs.

MS. POOLE: We certainly can do that.

THE COURT: Thank you.

MR. LEE: Your Honor, if the plaintiffs could identify the declaration that they are not going to object to.

THE COURT: Yes. Any unobjected to declarations?

MS. POOLE: We do not intend to object to the two redacted portions of Mr. Johns declarations that DWR identified yesterday.

THE COURT: All right. Thank you.

MR. LEE: Your Honor, we have those -- copies of those declarations in full. We have not -- they are lengthy, we have not crossed out any of the provisions. But we would

only rely upon those paragraphs and those exhibits that we specifically identified yesterday.

If the Court prefers, we can get a marker and cross them out or we can just simply submit them with the understanding that the Court and the state --

THE COURT: How am I going to know what's redacted?

MR. LEE: We've identified them specifically in our statement. I can --

THE COURT: It's a lot easier for me if you line them out.

MR. LEE: I'll line them out for you, then, Your Honor. Not a problem.

THE COURT: Thank you.

MS. POOLE: Your Honor, if I may, one other small housekeeping matter related to this. There's also a declaration of mine, of Katherine Poole, submitted on July 23rd that authenticate some government documents that we presented in the written filings. And we do intend to move that into evidence.

THE COURT: All right. Well, if it's an authentication, that shouldn't be objectionable. Unless there's some rule of evidence that it would violate.

MR. WILKINSON: We'd like to look at it, I think, Your Honor.

THE COURT: Of course.

MR. WILKINSON: Doesn't seem like there would be an objection.

THE COURT: We can revisit this at 1:30.

All right. We are now going to resume the cross of Dr. Hanson. Mr. Wall.

CHARLES HANSON,

called as a witness on behalf of the State Water Contractors, having been previously sworn, testified as follows:

MR. WALL: Thank you, Your Honor.

CONTINUED CROSS-EXAMINATION

BY MR. WALL:

Q. Good morning, Dr. Hanson.

A. Good morning, Mr. Wall.

Q. Dr. Hanson, within the past couple of days, you've learned of some new survey results with respect to the delta smelt; correct?

A. That is correct.

Q. And those survey results show a continuing decline in the species; correct?

A. That is correct.

Q. The present abundance of delta smelt is extremely low.

A. Yes.

Q. And delta smelt could go extinct this year, even if all of the actions proposed by the Court are adopted; correct?

A. Unfortunately correct.

Q. Given that present status of the delta smelt, you would recommend operating the CVP and SWP export facilities at the more protective end of the flow ranges you had proposed; correct?
A. That is correct.
Q. And the flow ranges you have proposed --
THE COURT: Can I interrupt?
MR. WALL: Yes.
THE COURT: The witness obviously understood it, but perhaps for my benefit, you could have him explain what he means by "more protective range," because I think, given the parties positions, it could have different meanings.
BY MR. WALL:
Q. Let me ask you a few questions and hopefully this will address the Court's --
THE COURT: Thank you.
BY MR. WALL:
Q. Dr. Hanson, in your tier two proposal, you proposed that the projects operate in a manner to ensure negative flows on the Old and Middle River between minus 1,000 cfs and minus 6,000 cfs; correct?
A. Correct.
Q. And you would presently recommend that the projects operate at the less negative end of that range; correct?
A. It depends in part on the level of risk to the delta

smelt. If we had evidence that the delta smelt were distributed down in Suisun Bay, for example, the level of risk would be less. In which case then there might be more flexibility in how you chose the range to operate within that minus 6,000 to minus 1,000.

To the extent that delta smelt are moving upstream and in the area of vulnerability to the exports, then it seems to me, given the low population abundance, it would be prudent to operate towards the minus 1,000 end of the range.

Q. And it would also be prudent to operate towards the minus 1,000 end of the range if there was uncertainty about whether delta smelt were in the vicinity of the SWP and CVP export facilities; correct?

A. That is always taken into account, yes.

Q. Now, nothing in your proposal would require the agencies to operate at the low end of this range; correct?

A. Correct.

Q. Instead under your proposal, the decision would be left entirely up to the agencies; correct?

A. Correct.

Q. They would presumably meet and discuss and make a decision on their own under your proposal; correct?

A. That would be my assumption, that they would review the existing hydrodynamics and operations, delta smelt survey results. And based on that foundation of information, they

would make the decision, yes.
Q. And that review and discussion process within the agencies might look something like the DSRAM process?
A. Potentially. Although in my mind, given the circumstances that we have, I think that process needs to be accelerated.
Q. Dr. Hanson, your proposal doesn't include any mechanism for accelerating those discussions; correct?
A. We don't specify that, no.
Q. And you're aware that, under Ms. Goude's proposal, the agencies would have a meet and confer process that is entirely process oriented for deciding flow ranges; correct?
A. Yes. Although I remember Ms. Goude also testifying that she had been directed to take this matter seriously and to take actions.
Q. Would you assume that Ms. Goude has taken this matter very seriously in past years?
A. I believe that Ms. Goude has taken this seriously in the past years. Although I think the heightened sensitivity of the current circumstance elevates that even further.
Q. Dr. Hanson, Dr. Swanson's proposed remedial measures for the Old and Middle River flows are at the low end of the range she proposed; correct?
A. Correct.
Q. Her protective measure number four provides for Old and Middle River flows to be targeted at minus 3500 cfs during

January and February; correct?
A. That is correct.
Q. And her protective measure number five provides for Old and Middle River flows to be targeted at minus 1500 cfs in the pre-VAMP period; correct?
A. Correct.
THE COURT: How long is the pre-VAMP period?
BY MR. WALL:
Q. Are you familiar with the triggers for Dr. Swanson's protective measure number five?
A. Yes, I am. The pre-VAMP period, sir, would extend from the time that there's evidence that there has been spawning, and that could be triggered based on the occurrence of larval fish, could be based on the occurrence of spent adult females in the Kodiak trawl surveys, it could be based on water temperatures that we think are the triggers for delta smelt spawning. But it's intended to be started at the point where we have evidence that there are larval fish occurring within the system.
THE COURT: And that's usually not later than March?
THE WITNESS: That's usually not later than March.
BY MR. WALL:
Q. And Dr. Hanson, under Dr. Swanson's proposal, the agencies wouldn't have -- wouldn't engage in a process like the DSRAM process to decide to move flows up to minus 600 -- or 6,000

cfs; correct?
A. No, they're prescriptive triggers.
Q. So her proposals ensure that the agencies operate at the lower end of the range you proposed; correct?
A. That would be the result of those triggers, yes.
Q. Yesterday you offered some testimony about a relationship developed by Dr. Pete Smith at the US Geological Survey; correct?
A. Yes.
Q. And this is a relationship between negative flow or flow on the Old and Middle Rivers in January and February and salvage at the CDF and SWP projects; correct?
A. Correct.
Q. You criticized Dr. Swanson's reliance on Dr. Smith's relationship, did you not?
A. Yes, I did.
Q. And it's your understanding that Dr. Swanson rested her action number four on Dr. Smith's relationship; correct?
A. That is my understanding.
Q. And that understanding informed your view of Dr. Swanson's action number four; correct?
A. Yes, it did.
Q. You were here for Dr. Swanson's testimony; were you not?
A. I was.
Q. Do you recall that her reliance on Dr. Smith's work was

minimal and indirect?
A. I don't remember explicitly that testimony.
Q. Do you have in front of you Plaintiff's Exhibit 4, which is Dr. Swanson's declaration of August 13th?
A. Yes, I do.
Q. Could you please turn to the appendix which sets forth Dr. Swanson's revised recommended interim protective actions for delta smelt.
A. I have that.
Q. Please turn to action number five in the column that says "source and rationale." Action number five is Dr. Swanson's proposed flow regime for the pre-VAMP period; correct?
A. Correct.
Q. Nowhere in the source and rationale section of this table does she mention Dr. Smith's statistical relationship; does she?
A. No. And she shouldn't.
Q. And if you could please turn to action number seven. This is her proposed flow regime on the old and middle water in the post VAMP period; correct?
A. Correct.
Q. And nowhere in her source and rationale for this action does she mention Dr. Pete Smith 's relationship; correct?
A. No. Her basis for actions four, five -- or five, six and seven was based on the results of the preliminary analyses of

Dr. Bill Bennett. My understanding is that her action four, which is the minus 3500 cfs during the December 25th through February time period was the action that was based on the results of the Delta Smelt Working Group notes that contained the Smith analysis.

Q. Dr. Hanson, if you could respond directly to my questions we'll move faster through this material.

If you could please turn to proposed action number four and look at the source and rationale. Do you see that the listed source and rationale includes the Delta Smelt Working Group notes and the Department of Water Resources Pelagic Fish Action Plan?

A. I do.

Q. That Pelagic Fish Action Plan was dated March, 2007?

A. Yes.

Q. And do you see that Dr. Swanson states that she recommended the flow at the lower end of the range that is recommended by the Department of Water Resources in its Pelagic Fish Action Plan?

A. Yes.

Q. It's also at the protective end of the range of flows that you would recommend for this time period?

A. It's within the range I've recommended, yes.

Q. And it's the protective end of the range that the Fish & Wildlife recommended for this time period?

A. It is also within that protective range, yes.
Q. Dr. Hanson, if I could ask you to turn to your own declaration of -- I believe it's July 23rd, let me just confirm that. Actually I believe it's your supplemental declaration. It's Exhibit 4, which is this figure we've been discussing involving a DWR re-analysis of Dr. Smith's relationship.
A. Correct.
Q. Now, if you look at Exhibit 4 of your declaration, which is State Water Contractor G, and you look at January 2001. It shows that the average monthly Old and Middle River flows for January 2001 were something around minus 4600 cfs; correct?
A. Correct.
Q. And this is one of the data points that you relied on in forming your conclusion that there is small biological benefit to keeping average monthly Old and Middle River flows below minus 6,000 cfs; correct?
A. Correct. I relied on the relationship.
THE COURT: Am I misreading this that the '01 on the Exhibit 4 I have seems to be above the -- well -- well, there are no cross hatches. It is less than 5,000 and I can't tell how much. So 4600 is an estimate. Proceed.
MR. WALL: Yes, Your Honor.
Q. Do you know if there were any significant number of delta smelt in the vicinity of the CVP and SWP export facilities in

January, 2001?
A. I do not know.
Q. Without that information, this data point doesn't provide you any assurance that Old and Middle River flows of minus 4600 cfs are protective of delta smelt; correct?
MR. LEE: Objection, Your Honor, what does the -- what does the counsel means by "assurance"?
THE COURT: Do you understand the question?
THE WITNESS: I believe that I do.
THE COURT: Overruled. You may answer.
THE WITNESS: I didn't scrutinize each of the individual data points. I relied on the relationship that was drawn through those data points. But there is uncertainty with respect to the geographic distribution and the occurrence of smelt as well as reverse flows for probably virtually every one of these data points.
BY MR. WALL:
Q. The relationship is based on a set of data points; correct?
A. Correct.
Q. And moving those data points has an impact on the relationship; correct?
A. Correct.
Q. So, for example, if you were to -- only interested in negative flows on the Old and Middle River and were to remove

the years '06 and '97 from this exhibit, the relationship would look somewhat different; correct?
A. I don't believe that it would. It would still be driven by '98, '99, '94.
Q. There wouldn't be a long tail stretching off to the right; correct?
A. There would not be.
Q. So the relationship would look somewhat different; right?
A. In that regard, yes.
Q. And if several of the data points involved months when there was no significant delta smelt in the vicinity of the pumps, that would affect this relationship as well; correct?
A. That would affect the relationship.
Q. So, for example, if, in January '01, there were -- was no significant population of delta smelt in the vicinity of the export facilities, that data point would not provide meaningful information with respect to the relationship between negative flows on the Old and Middle River --
MR. LEE: Objection, Your Honor, the word "meaningful information" is vague.
MR. WALL: I'm sorry, I hadn't finished the question, if counsel could please wait for me to finish.
THE COURT: All right. Let's have the question completed and I'll rule on the objection.
BY MR. WALL:

Q. Dr. Hanson, if, for example, there were not significant numbers of delta smelt in the vicinity of the project export facilities in the month of January during some of these years, the data points reflecting salvage in those years would not provide meaningful information to you about the relationship between negative flows on the Old and Middle River and salvage of delta smelt when they are in the vicinity of the pumps; is that correct?

A. That is correct.

MR. LEE: Objection.

THE WITNESS: It would be from that data point.

BY MR. WALL:

Q. Do you have in front of you the exhibit that's been marked Plaintiff's Exhibit 19?

A. Could you describe the exhibit?

Q. Yes. It's a set of three figures that we were discussing at the end of the cross-examination yesterday. It's in color and it says at the top, "CVP and SWP Salvage and Monthly Old and Middle River Flows for Years 2000 and 2002."

MR. LEE: Your Honor, we have it designated as 19. As not 16.

MR. WALL: I may have misspoke.

THE COURT: This is Plaintiffs' 19.

MR. LEE: Plaintiffs' 19.

THE COURT: All right. I have it. I thought you

said State Water Contractors exhibit.

MR. WALL: I may have misspoken, Your Honor. I apologize for that.

THE COURT: Thank you. I have it. Do you have it, Dr. Swanson? I'm sorry. Dr. Hanson.

THE WITNESS: I haven't found it yet, but I'm sure it's here. I do have it.

BY MR. WALL:

Q. If you could look at the middle graph. This figure reflects that there were probably very few delta smelt in the vicinity of the CVP and SWP export facilities until mid February, 2001; correct?

A. That is correct.

Q. And it also reflects that there probably -- that the bulk -- in 2002, the bulk of the delta smelt population had passed by the export facilities by the beginning of January; correct?

A. Could you restate that, please?

Q. If you look at the bottom figure on this page.

A. The bottom figure.

Q. It also suggests that the bulk of the delta smelt population had passed through the vicinity of the export facilities by early January; correct?

A. What it shows is that the peak of the salvage occurred in early January and tapered off by the end of January, yes.

Q. And if you look at 2000, this also suggests that the bulk of the delta smelt population passed by the export facilities in the month of February rather than the month of January; correct?
A. That's one hypothesis, yes. It certainly shows that salvage was substantially lower in January and increased in February, yes.
Q. And you have no basis for -- you have no reason to believe the hypothesis as you described it, that I just laid out is incorrect; right?
A. I have no basis to believe that's not correct.
Q. So this information is entirely consistent with very few delta smelt being in the vicinity of the export facilities in January, 2000, 2001 and 2002; correct?
A. It is consistent with that, yes.
Q. And if that hypothesis, as you describe it, were correct, the relationship between flows on the Old and Middle River and salvage of delta smelt in January 2000 and January 2001 and January 2002 that's reflected on Exhibit B would provide very little information about the relationship between Old and Middle River flows and salvage when delta smelt were in the vicinity of the export facilities; correct?
A. That is correct.
Q. Now, if you could -- I think we have marked but not yet admitted Plaintiffs' 18, which is a declaration of Mr. Johns.

Could you please look at that. And if I could ask you, in particular, to look at Exhibit C to Mr. Johns' July 9th, 2007 declaration.

A. I have that.

Q. This exhibit says at the top, "February total delta smelt salvage at the State Water Project and Central Valley Project South Delta Facilities and average Old and Middle River flows"; correct?

A. Correct.

Q. For example, I could ask you to look at the data point for February, 2001. Do you see that?

A. I do.

Q. This shows take of almost 4,000 smelt at Old and Middle River flows of about minus 6,000 cfs; correct?

A. That is correct.

Q. This is also one of the data points that you relied on for your conclusion that salvage increases when Old and Middle River flows exceed minus 6,000 cfs; correct?

A. Yes. I relied on the relationship that's driven by these data points.

Q. If you could turn back to Plaintiffs' 19, the three figures.

A. Yes.

Q. This figure reflects that significant salvage did not occur in the first third of February; correct?

A. That is correct.
Q. Do you have any idea how the average Old and Middle River flows compared in the first third of February with the remainder of February?
A. I do not.
Q. Do you have any basis to believe that the monthly average Old and Middle River flows for February, 2001 that were used to plot Exhibit C are representative of both the beginning and the end of the month?
A. I would believe that they should include all of the data for February, so they would represent both the beginning and the end of the month.
Q. But you don't know if those were higher at the beginning or higher at the end of the month?
A. I can only speculate.
Q. I'm not asking you to speculate. You don't know if, for example, flows were zero at the beginning of the month?
A. I do not.
MR. WILKINSON: Calls for speculation.
THE COURT: Well, the objection is overruled. The answer will stand.
BY MR. WALL:
Q. Dr. Hanson, is it fair to say that Exhibits B and C of the Johns declaration that's been marked as Plaintiffs' 18 both look at the relationship of salvage as against average monthly

flows on the Old and Middle River?
A. That is correct.
Q. And that monthly average flow information ignores or obscures important variations in salvage within a month?
A. It does not reflect salvage within a month, the variation of salvage within a month.
Q. It obscures that information; correct?
A. It does.
Q. And it splits salvage events in half across some months; correct?
A. To the extent that there is salvage extending, a peak of salvage extending between two months, it would, yes.
Q. And that, in fact, sometimes occurs; correct?
A. I would imagine that it does.
Q. So you might have a month where average Old and Middle River flows seem to be protective because salvage only occurred at the end of the month and not through the entirety of the month; correct?
A. That could occur, yes.
Q. And you don't know in which of these months that might or might not have occurred; correct?
A. I did not go back and look at that, no.
Q. Now, originally, Dr. Hanson, you proposed Old and Middle River flows as high as minus 6,000 cfs based on your understanding that salvage increased significantly with flows

more negative than that; correct?
A. That is correct.
Q. And that was based on your understanding of the relationship between salvage and monthly average flows; right?
A. Based on Exhibits B and C of Jerry Johns declaration, yes.
Q. Have you ever looked to see whether significant salvage can occur when daily Old and Middle River flows are minus 4,000 cfs in February?
A. We have seen occasions where that does occur.
Q. So you are aware of occasions where significant salvage occurs when daily Old and Middle River flows are minus 4,000 cfs?
A. We have seen individual events where that has occurred, yes.
Q. And have you ever looked at whether significant salvage can occur when daily Old and Middle River flows are minus 2,000 cfs?
A. There is salvage that has occurred at minus 2,000 cfs, yes.
Q. Significant levels of salvage?
A. It's -- the idea of whether it was significant or not is dependent upon a whole variety of variables. In some of the previous years, there has been, you know, elevated levels of salvage at these lower levels of reverse flows, yes.
Q. Elevated levels of salvage at Old and Middle River flows

at minus 2,000 cfs; correct?
A. On occasion.
Q. Now, with that in mind, if we didn't have perfect information about the whereabouts of delta smelt, wouldn't it be prudent to operate the export facilities at levels that ensure only modest negative flows on the Old and Middle River?
A. That would be one choice. It depends on the risk analysis and the data that you have to work with.
Q. But if -- given the precarious present state of the delta smelt which you've testified, if we didn't have perfect information on the location of the delta smelt, wouldn't it be prudent to operate on the more protective side of these flow ranges?
A. I would imagine that that would be the decision the Fish & Wildlife Service would make under those circumstances, yes.
Q. It hasn't always been the decision Fish & Wildlife Service made in the past; correct?
A. In the past, those decisions have been made for a variety of reasons. I'm not party to those decisions, so I don't know the rationale.
Q. But you know the outcome.
A. I know the outcome.
Q. And in the past, the Fish & Wildlife Service, given the choice -- rather the Bureau of Reclamation, given the choice, did not always operate these facilities at the more protective

end of the flow ranges you've recommended?

MR. WILKINSON: Objection. Vague as to time.

THE COURT: Sustained. You may rephrase.

BY MR. WALL:

Q. Dr. Hanson, this past summer, spring and summer, the Bureau of Reclamation was not under a court order to reduce pumping at its export facilities; correct?

A. Correct.

Q. And exercising its discretion, it, for a time significantly reduced pumping at the export facilities; correct?

A. There were significant reductions in exports this past summer, yes.

Q. And the Department of Water Resources also, for a time, chose to significantly reduce or stop pumping at the State Water Project --

A. For a period it was completely shut off.

Q. And then both those projects began to increase their export operations again; correct?

A. Correct.

Q. And during the time in which they decided to increase their export facilities again -- export rates again, significant salvage of delta smelt occurred; correct?

A. There were delta smelt salvages that, in the early parts of that period, were greater than 100 fish, yes.

Q. And there were salvage events that were greater than 300 fish in a single day; correct?
A. There may have been, yes.
Q. There was several days where salvage occurred in excess of 300 fish in a single day; correct?
A. I haven't got those records before me, but the salvage was in that magnitude on several days.
Q. So in the past, given the discretion, the operators of these projects have not always chosen to operate the export facilities at the more protective end of the range that you have recommended?
MR. WILKINSON: Objection. Vague as to time.
MR. WALL: Well, last year.
THE COURT: The question has been amended. You may answer.
THE WITNESS: They have reduced their exports. I don't know specifically what those exports were, but they were reduced and then they ramped up during that late spring early summer time period.
BY MR. WALL:
Q. They ramped up and took significant number of delta smelt; correct?
A. There were delta smelt that were salvaged, yes.
Q. Significant number; correct?
A. In excess of 100 on some days.

Q. Now, in preparing your remedy proposal, you applied a test to decide whether a particular remedy was necessary or not; correct?
A. We had a tiered approach so that as conditions changed, if we saw evidence that delta smelt were becoming progressively more at risk, then we implemented more restrictive measures, yes.
Q. And your tier two proposal, which established a range of flows on the Old and Middle River at minus 1,000 and minus 6,000 cfs, might have ended after the water cost exceeded a pre-determined threshold; correct?
A. They weren't proposed to end. It was proposed to be a period where folks would reflect on the performance of the program and whether it was achieving its objective. If it was decided that smelt were still at risk, then there would be no cap, it would continue on.
Q. Well, didn't your declaration say that your tier two proposal would end if the water cost exceeded a certain amount unless the Fish & Wildlife Service made a finding that, quote, without further protection on an interim basis, delta smelt would, quote, experience a high risk of possible extinction?
A. It does. And that's the kind of reflection that we were referring to.
Q. So under your proposal, as long as the delta smelt didn't face a high risk of extinction, your tier two would end as

soon as this water cost cap was met; correct?
A. Under that circumstance, if the risk was reduced and delta smelt weren't in jeopardy, then that action could be curtailed, yes.
Q. That wasn't my question.
A. Oh.
Q. My question was under your proposal, as laid out in your declaration, tier two would end if it exceeded a pre-determined water cost unless there was a high risk of possible extinction of the delta smelt; correct?
A. That is how I characterized it, yes.
Q. So under your proposal, tier two would end even if the projects were continuing to appreciably reduce the value of Delta smelt's critical habitat for that species recovery; correct?
A. No. If the Fish & Wildlife Service determined that that was adverse, then tier two would continue.
Q. But under your proposal, the test wasn't whether that was adverse; correct? It was whether the delta smelt would experience a high risk of possible extinction. Correct?
A. Correct.
Q. Your proposal doesn't specifically provide for this tier two measure to continue if project operations are appreciably reducing the value of critical habitat in the Delta smelt's recovery; correct?

A. Explicitly, no.
Q. And in fact, it says tier two would end unless the Fish & Wildlife Service made a finding that it needed to continue to prevent a high risk of possible extinction; correct?
A. That is how I characterized it, yes.
Q. Dr. Hanson, your tier two proposal would also have a floor of minus 1,000 cfs; correct?
A. Correct.
Q. And as I understand it, you set that floor based on your understanding that there might be other diversions on the Old and Middle River?
A. Just recognizing that there are other diversions on Old and Middle River.
Q. You have never quantified the combined effect of those -- at least you haven't presented any testimony about the combined effect of those other diversions; correct?
A. I have not.
Q. And the Contra Costa Water District has a diversion; correct?
A. They do.
Q. And at certain points in the year, that diversion is turned off; correct?
A. There is a period as specified in their Biological Opinion where they do not divert. There's a period where they do not divert to storage. Those periods could be modified from one

year to the next based on consultation with the Fish & Wildlife Service.

Q. But your proposal of the floor of minus 1,000 cfs did not take that into account; correct?

A. It did not.

Q. Let me turn to your tier three remedy proposal. If I understand your tier three remedy proposal, it would, if triggered, result in curtailing export operations at CVP and SWP export facilities to the minimum level needed to protect public health and safety; is that correct?

A. That is right.

Q. And this tier three proposal would take effect only in the event that routine salvage monitoring show, at the SWP or CVP export facilities, that there's been a dramatic increase level of incidental take as a direct result of SWP and CVP export operations; correct?

A. That was how we envisioned it, yes.

Q. And you agree that this is like locking the barn door after the horse has been stolen; correct?

A. It is our final fallback measure and would be triggered when we start to see salvage increase. Its purpose is to avoid further salvage that might occur. For example, as we look at your Exhibit Number 19, we see evidence of an increasing trend in delta smelt salvage leading to a peak. It's the peak that we're trying to avoid.

Q. Dr. Hanson, let me focus back on the trigger salvage. Now, salvage is not a complete count of entrainment at the project export facilities; correct?
A. Correct. Salvage is a subsampling.
Q. And entrainment exceeds salvage by an unknown amount; correct?
A. Correct.
Q. And you were here for Dr. Swanson and Dr. Moyle's testimony?
A. Yes, I was.
Q. And did you hear them testify that they believed that entrainment exceeded salvage by a significant amount?
A. I didn't hear that testimony.
Q. Are you aware of any information that would contradict such testimony?
A. No. That there is salvage of larval delta smelt, for example, that is not included in the salvage estimates. There are fish that were entrained that are not included in these estimates. How large that number is is still open to debate. But certainly larger than what the salvage reflects.
Q. Now, one of the ways of knowing whether delta smelt are in the vicinity of the pumps is through monthly survey results; correct?
A. Not necessarily monthly survey results, but through survey results, yes.

Q. Some of the surveys are conducted on a bi-weekly basis?
A. Some of the surveys, like the 20 millimeter survey and summer townet are on a bi-weekly basis.
Q. And some of the surveys are conducted on the monthly basis?
A. Fall midwater trawl, for example, is conducted on a monthly basis.
Q. Now, if, under your tier three proposal, the project export facilities curtailed their pumping and took four days to consider what to do next, they may not have any new survey information in those four days; correct?
A. That would be a possibility.
Q. In fact, it would be a likelihood given the infrequency of surveys; correct?
A. One of the things that we recognized in my declaration is that the existing surveyed protocols may need to be augmented. I wouldn't -- in fact, I proposed in the past daily monitoring in Old and Middle River at the confluence with the San Joaquin River to provide an enhanced level of monitoring to allow us better resolution on detecting the potential occurrence and movement of delta smelt into this area of vulnerability.
Q. But --
A. That's not part of the routine monitoring.
Q. And your proposal is based on a routine monitoring trigger; correct?

A. My proposal is based on a routine monitoring trigger, but it doesn't preclude the additional monitoring that would be used for that other purpose.
Q. Your proposal would not require that additional monitoring you've just described; correct?
A. It would not require it, but my experience in dealing with water operators in the past is that if we have a decision that's made based on monthly monitoring that adversely affects them, there's a motivation to provide for more frequent monitoring that gives better resolution to that decision.
Q. Dr. Hanson, it would be helpful for us to move through this quickly to just answer my question. Okay?
MR. WILKINSON: I'm going to object to that, Your Honor, the witness is entitled to explain his answers, in my opinion.
THE COURT: All right. The answer's at least partially responsive. Counsel has requested that you endeavor to answer directly only the question that's asked. And if you need to explain, you may say "I need to explain."
THE WITNESS: Thank you, Your Honor.
THE COURT: Thank you.
BY MR. WALL:
Q. Dr. Hanson, by the time a dramatic increase in salvage was detected by routine monitoring, many delta smelt may already have been entrained or diverted from their preferred habitat

by operation of the export facilities; correct?
A. There is that possibility, yes.
Q. Now, since sub-20 millimeter delta smelt are not counted as part of the projects' routine salvage estimates, a dramatic increase in entrainment of those smelt would never trigger your tier three protection; correct?
A. It would not unless results of, say, the 20 millimeter survey showed a marked increase in distribution in the south Delta.
Q. Well, under your proposal, as you laid it out in your declaration, it is triggered by a dramatic increase in salvage measured by routine salvage monitoring at the export facilities; correct?
A. Correct.
Q. And that routine salvage monitoring does not count sub-20 millimeter smelt; correct?
A. Correct.
Q. And by the time a dramatic increase in salvage for adult delta smelt was detected, hundreds of delta smelt or perhaps even thousands might have been entrained in the Clifton Court Forebay; correct?
A. There is that possibility, yes.
Q. Past experience suggests that can, in fact, happen; correct?
A. Past experience suggests that that could happen, yes.

Q. And once delta smelt entered the Clifton Court Forebay, there is very little chance that they'll emerge alive, even if exports are curtailed; correct?
A. Correct.
Q. They may die in the forebay?
A. Predation mortality and other sources within the forebay, yes.
Q. They may die by being pulled through the louvers and into the pumps?
A. Possibly, yes.
Q. They may die as a result of salvage activities?
A. Salvage handling results in significant stress potential, yes.
Q. Now, Dr. Hanson, you offer a definition of a dramatic increase in salvage in your declaration; don't you?
A. I don't remember explicitly, but I tried to provide some examples, yes.
Q. Do you recall saying that a dramatic increase in salvage would occur when salvage increases by a factor of ten over the average of the preceding three days of salvage?
A. That was one of the ideas that we were discussing at the time, yes.
Q. That's the only idea for finding dramatic increase in salvage take in your declaration; correct?
A. I believe so, yes.

Q. Let me just work through some numbers with you. I'm going to put some numbers on the Elmo. I guess it's warming up.

Let's just say that this reflected the salvage at the facilities. On the left you have day one through ten and on the right you have the salvage.

Now, on none of those days does the salvage exceed the average of the salvage for the preceding three days by a factor of ten; correct?

A. Correct.

Q. So on day one, you have a salvage of five fish. And day two, a salvage of ten fish. And day three and four a salvage of -- actually, let me fix this number a little bit. Day three you have salvage of 20 fish. Day four, salvage of 75 fish. Day five, a salvage of 180 fish. Et cetera, down on. You could get up to a couple of thousand delta smelt a day being salvaged without ever having exceeded the trigger specified in your declaration of salvage going up by a factor of ten over the preceding three-day average; correct?

A. Correct. This would suggest that trigger would not be responsive to those events.

Q. Do you have your declaration of August 13 in front of you?

A. Yes, I do.

Q. Bear with me. I can't find it in all my papers. Yes, I believe it's State Water Contractor Exhibit G.

A. Correct.

Q. And could you turn to Exhibits 5 and 6 of State Water Contractor G, your August 13 declaration.
A. I have those.
Q. Am I correct that Exhibits 5 and 6 show the level of salvage during the months of June and July, 2007?
A. That is correct. These were taken from the US Bureau of Reclamation Mid-Pacific web page.
Q. And yesterday we saw a subset of this data beginning on July 15th; correct?
A. That is correct.
Q. And after July 15th, salvage quickly ended; correct?
A. Correct.
Q. But prior to that, there were a number of days in June and July where salvage exceeded 100 fish; correct?
A. Correct.
Q. Several days in which salvage exceeded 300 delta smelt; correct?
A. There were several days, yes.
Q. Now, this chart also shows the daily export rate of the CVP and SWP; correct?
A. Correct.
Q. That's in the column marked "daily total pumping" and "cfs"; correct?
A. Correct.
Q. And it shows that the -- during the period of June 1 to

June 15th, pumping at the Banks Pumping Plant was between zero and -- sorry, between June 1 and June 12th was between zero and 800 some cfs; correct?

No, I'm sorry, I'm looking at the wrong column. Between -- let's look at June 1 through June 12, pumping at the Banks Pumping Plant was between zero and 200 cfs; correct?

A. Correct.

Q. I think I still have that wrong. I'm looking at the wrong column, I apologize for this. If you look at June 1 through June 12th, the daily total in cfs for Banks was between zero and 100 cfs; correct?

A. That is correct.

Q. And at all times the pumping at the Tracy facility was less than 1,000 cfs; correct?

A. Correct. Less than about 850.

Q. And on most of those days, there was no salvage at the export facilities; correct?

A. On most of those days, there was none.

Q. And in the second half of June, the export rates from these facilities began to increase; correct?

A. Correct.

Q. And salvage began to increase in proportion to that; correct?

A. Not necessarily directly in proportion. But as salvage went -- or as export rates went up, salvage went up. But

there's quite a bit of variability.
Q. That was a time period during which the projects were not operating under a court order to reduce their export rates; correct?
A. Correct.
Q. Dr. Hanson, yesterday you were asked about the advisability of conducting new surveys; correct?
A. I was, yes.
Q. And you were asked -- you testified that you had been denied a permit by the Fish & Wildlife Service to conduct surveys; correct?
A. I was denied, yes. I was denied by the Department of Fish & Game. It was approved by the Fish & Wildlife Service.
Q. I'm sorry. So the Department of Fish & Game denied that permit?
A. Correct.
Q. And the basis of that denial was that your survey would take too many delta smelt; correct?
A. Correct. Even though I had projected that my survey would take relatively few delta smelt. It was considered to be too many.
Q. But you agreed, did you not, that the Department of Fish & Game's decision to deny your permit on the basis that it would take too many delta smelt was the correct decision given the present precarious state of that species; correct?

A. Given the present circumstances, I agreed with that decision.
Q. You wouldn't advise taking even 100 or so additional delta smelt at this point; correct?
A. Well, my study was a discretionary study. It was aimed at answering a different question that could be answered in other ways. And so we identified an alternative.
Q. But there was a risk to the delta smelt of taking even 100 of the fish that couldn't be justified; correct?
A. For my study, yes.
Q. Let me direct your attention to Dr. Swanson's proposed remedial actions. And your testimony on that subject.

Now, you believe that the amount of habitat available to delta smelt is not presently the limiting factor for the species; correct?
A. I don't believe that it is.
Q. And you were aware of no evidence that habitat quantity is the limiting factor for delta smelt; correct?
A. At these current low population levels, I do not.
Q. Habitat quantity might be a limiting factor for delta smelt recovery; correct?
A. As the population increases in abundance, then habitat volume may be a limiting factor.
Q. So the answer to my question is yes?
A. At some point in the future, yes.

Q. You're not aware of any evidence -- sorry. You're -- did I -- you testified that you're not aware of evidence that habitat quantity is presently limiting delta smelt?
A. I'm not aware of evidence of that.
Q. And your lack of awareness of any such evidence informed your view of Dr. Swanson's proposed fall action; correct?
A. In part, yes.
Q. You're familiar with the article that we've been discussing in this case by a group of scientists, Feyrer, et al.?
A. Yes, I am.
Q. And I apologize if I'm mispronouncing Dr. Feyrer's name.
Now, Dr. Feyrer --
MR. WILKINSON: I believe it's Mr. Feyrer.
BY MR. WALL:
Q. Ah. Mr. Feyrer. He's a scientist with the Department of Water Resources; correct?
A. Yes, he is.
Q. And his co-authors are scientists at the Department of Water Resources?
A. Yes.
Q. Their article looks at habitat quality; correct?
A. Correct.
Q. And your testimony about limiting factors related to habitat quantity; correct?

A. In part, yes.
Q. Now, Feyrer, et al., specifically looked at habitat quality in the fall months; correct?
A. That is correct.
Q. And they found that their results supported the conclusion that water quality was an important predictor of delta smelt abundance; correct?
A. They did.
Q. It specifically found that the results of their regression modeling supported the view that water quality was an important predictor of delta smelt abundance during the post Corbula period; correct?
A. They did look at both pre Corbula and post Corbula periods and had different results between those two, yes.
Q. And in the post Corbula period, 1987 to 2004, they found that their analysis supported the conclusion that water quality was an important predictor of delta smelt abundance.
A. They did.
Q. And one of the measures they looked at for habitat quality was something called specific conductance.
A. Correct.
Q. Which is a measure of salinity; correct?
A. Correct.
Q. They also looked at Secchi depth, which is a measure of turbidity or clarity; correct?

A. Transparency, yes.
Q. They found that Secchi depth and specific conductance were important factors explaining the occurrence of delta smelt; correct?
A. They did find that, yes.
Q. And they suggest that fall water quality may be an important factor for delta smelt abundance in the past two decades; correct?
A. Water quality in the fall within the Delta is an important component.
Q. And that's what they found; correct?
A. They found that as well, yes.
Q. Looking at clarity and salinity in particular.
A. Correct.
Q. And they found that the results of -- their results, with respect to delta smelt and the impacts of salinity, were consistent with laboratory studies on the Delta smelt's physiological tolerances to salinity; correct? Well, actually, why don't we just --
A. I --
Q. If you have in front of you, Feyrer -- which is plaintiffs' Exhibit 5. If we could just turn to the relevant page. Let me know when you have that in front of you.
A. I have that.
Q. And if you could -- looks like page 728 is just a series

of figures. So the text under the discussion section jumps from page 7 -- sorry, 729 is a bunch of figures. The text in the discussion section jumps from page 728 to 7 --

A. 31?

Q. I'm sorry. I have the page numbers wrong. 730 is just Figure 6. So the text that I'm looking at jumps from page 729 and then goes to 731.

A. Correct.

Q. Let me just read you the sentence that carries over from page 729 to page 731.

Let me know if I get this right.

"For delta smelt, our results are consistent with laboratory studies on their physiological tolerances to salinity"; is that correct?

A. That is correct.

Q. And in support of that, they cite to Dr. Swanson's article from 2000; correct?

A. That is correct.

Q. That's her article on delta smelt tolerance to salinity that was published in a peer review journal; correct?

A. That is correct.

Q. Dr. Hanson, you've never published any research on delta smelt in a peer review journal; correct?

A. I have not.

Q. And, in fact, you've only published one article on fish in

a peer review journal in the last 16 years; correct?
A. I haven't checked, no, but that's potentially correct, yes.
Q. Feyrer, et al., concluded that the increase in salinity during the period they studied is likely a function of decreasing river flow entering the estuary during the fall. Correct?
A. That is correct.
Q. And they concluded that the increase in salinity appears to result from lower releases from upstream dams and more water being exported from the south Delta; correct?
A. Correct.
Q. Dr. Hanson, you have proposed no remedial measures to address the lower releases from upstream dams; correct?
A. Correct.
Q. Now, yesterday when you were discussing the Feyrer article, you mentioned that one of the sampling stations that they considered showed improved environmental quality in recent years; correct?
A. They found a significant increase in environmental quality over time at one station.
Q. A statistically significant increase.
A. Was statistically significant.
Q. Now, if you look at that one station, what proportion of the Delta smelt's critical habitat does it represent?

A. I don't know, but it would be a very small percentage.
Q. Relatively tiny percentage; correct?
A. It would be a tiny percentage.
Q. Dr. Hanson, could I ask you to turn to the last sentence of the Feyrer article, which is on page 732. And I'm going to read you the sentence because I believe it's one that you've focused on in your previous testimony. Let me know if I get this sentence correct.

"Moreover, for the water quality data to be most effective for species management, additional information is needed to better define the mechanism for the effect of water quality variables on aquatic organisms."

Did I get that right?
A. You did.
Q. Dr. Hanson, there is a difference between an action being effective and being most effective; correct?
A. There is.
Q. And we always like more information to make our actions more effective, if possible; correct?
A. Correct.
Q. Nothing in that sentence suggests that the author has found that improving fall water quality would be ineffective for protecting delta smelt during this period; correct?
A. They do not conclude that it would be ineffective.
Q. Instead they suggest they'd like more information to make

the management of water quality most effective; correct?
A. That is what they say.
Q. Do you have in front of you plaintiffs' Exhibit 11, which is Dr. Swanson's July 23rd declaration?
A. Yes, I do.
Q. If you could turn to Exhibit V. Exhibit V, I believe, if you turn to the very back, you'll see a set of pages that are numbered 1 to 41. And at the top, if you turn to page 15, you'll have the cover page for Exhibit V and 16 is where the exhibit actually starts.
A. Is that different than the Exhibit B that I have on page 5 of 22?
Q. I'm sorry, Dr. Hanson, I'm saying V as in Victor.
A. Oh, V as in Victor. What was that page again?
Q. 16 of 41 at the very end. These have separate page numbers because they were too voluminous to be filed as a single document.
A. I have that.
Q. And this is a set of notes from the Delta Smelt Working Group. Correct?
A. Dated July 10, 2006.
Q. I'm going to read you the discussion under the heading "minutes." And let me know if I have this correct. "Ted Sommer" -- now, Ted Sommer was -- he was one of the authors of the Feyrer article; correct?

A. He was, yes.
Q. That's Dr. Sommer of the Department of Water Resources; correct?
A. Correct.
Q. Let me read this. "Ted Sommer presented an outline of potential actions (see attachment 1) that the working group used to rank potential actions to protect delta smelt." Do I have that correct so far?
A. You do.
Q. Continuing, "The working group developed a ranking system for each of the potential actions to clarify the action's biological basis and its likelihood of successful implementation in the next 12 months."
Do I have that correct?
A. That is correct.
Q. Then there's a column that says "biological basis for the next 12 months"; correct?
A. Correct.
Q. And zero represents no biological basis?
A. Correct.
Q. Three represents "correlation present."
A. Yes.
Q. Four says "some causation known."
A. Correct.
Q. And five is the strongest category, "strongly supported by

evidence."
A. That is correct.
Q. And then the second column is "likelihood of successful implementation." Correct?
A. Correct.
Q. A is "not worth doing" and C is "very likely."
A. Correct.
Q. And that means very likely of successful implementation; correct?
A. That is my understanding, yes.
Q. Let me ask you to move forward two pages to attachment 1, which says "Alternatives to improve delta smelt abundance during the next year." Let me know when you found that page.
A. I have that page.
Q. It says "Draft revised July 17th, 2006" on the top.
A. Correct.
Q. It's your understanding that this is the attachment to which the Delta Smelt Working Group notes refer?
A. I believe that it is.
Q. Let me ask you to look at the paragraph that says "Fall actions (September through November)." Are you there?
A. I am.
Q. And it says, "Habitat improvements hypothesis: Higher fall flows (total Delta outflow) will increase the amount of habitat for delta smelt." Correct?

A. Correct.

THE COURT: You know, I'm not caught up with you. I'm on page 18 of 41. And I don't see the reference to the fall flows.

MR. WALL: Are you on the page that has "alternatives to improve delta smelt abundance during the next year"?

THE COURT: I am. It's 18 of 41.

MR. WALL: Your Honor, the second bold face heading says "Fall actions."

THE COURT: There. Yes. Now I see it. Thank you.

MR. WALL: And it says "habitat improvements."

THE COURT: Yes.

MR. WALL: "Hypothesis: Higher fall flows (total Delta outflow) will increase the amount of habitat for delta smelt."

THE COURT: Yes.

BY MR. WALL:

Q. And the ranking on that is 3/4 C; correct?

A. 3/4 C, yes.

Q. And if you turn back two pages, the biological basis for three and four is "correlation present" and "some causation known"; correct?

A. Correct.

Q. And "C" reflects a very high likelihood of successful implementation in the next 12 months; correct?

A. That's what that suggests, yes.
Q. Do you believe that existing water quality standards adequately protect delta smelt critical habitat in the fall?
A. They do provide protection for water quality. I have not done any kind of an assessment as to what the magnitude of that protection would be, so I really don't know.
Q. Those existing water quality standards are set forth in the Water Rights Decision D 1641; correct?
A. They are, correct.
Q. Even with those standards in place, CVP and SWP reservoir operations reduce fresh water inflow to the Delta in the fall; correct?
A. Correct.
Q. And they reduce the quality of the Delta habitat for delta smelt during the fall; correct?
A. They result in higher levels of salinity during the fall and the interior western portion of the Delta, yes.
Q. The water quality standards set forth in D 1641 were adopted in 1995; correct?
A. Correct.
Q. Delta smelt abundance has plummeted since 1995; correct?
A. Correct.
Q. Dr. Hanson, your tier one action would likely be implemented through release of water from upstream reservoirs in the San Joaquin River; correct?

A. It would be a combination of releases from upstream reservoirs and reduced exports.
Q. Those releases from upstream reservoirs would have a tendency to reduce the cold water pool available in those reservoirs; correct?
A. They would potentially do that, yes.
Q. Let me ask you to turn to an exhibit marked as State Water Contractor V. V as in Victor. It says at the top "Sacramento River Watershed Reservoir Storage."
A. I have that.
Q. This table does not list all of the water storage reservoirs upstream of the Delta; correct?
A. No, it does not.
Q. It doesn't even list all of the water storage reservoirs that are managed by the CVP and SWP upstream of the Delta; correct?
A. Only those on the Sacramento River side.
Q. Does not, for example, list New Melones?
A. Does not.
Q. And it does not list reservoirs on the Sacramento River side from which the CVP or SWP could purchase water; correct?
A. Does not.
Q. And for Shasta, this table lists a cold water pool of 1.90. Is that 1.90 million acre feet?
A. Correct.

Q. Dr. Hanson, are you aware that the present OCAP Biological Opinion issued by NOAA Fisheries allows the cold water pool in Shasta to drop below 1.9 million acre feet?
A. I do understand that it allows that currently. That's an issue that's currently being re-evaluated.
Q. Are you assuming that to protect salmon, the cold water pool has to be 1.9 million acre feet behind Shasta?
A. No, we're using this as a target figure.
Q. Now, this chart here does not list as an option for meeting flow through the Delta the curtailment of exports; correct?
A. That is another mechanism through which this could occur.
Q. And this chart doesn't list as an option for meeting Dr. Swanson's fall action the use of water that, under your proposal, would be released to satisfy your tier one objection -- or tier one measure beginning December 1; correct?
A. It does not.
Q. Dr. Hanson, do you remember filing a declaration or preparing a declaration in this case at the time of the TRO proceedings?
A. I do remember providing that declaration.
Q. Do you recall that that declaration was dated June 20th, 2007?
A. I don't recall.

Q. Let me represent to you that it was.
A. I accept that.
Q. Do you recall writing in that declaration, quote, "It is my opinion based upon recently collected data, including the relatively modest number of smelt salvaged at the project pumps, that the majority of delta smelt now appear to have moved away from the Clifton Court Forebay and other areas of the south Delta influenced by CVP and SWP pumping"?
A. I do remember looking at the Fish & Game survey data and I do remember that statement, yes.
Q. That statement turned out to be incorrect; correct?
A. The majority of delta smelt do appear to have moved away from the influence of the pumps, but not all of the delta smelt. Because there was continued salvage.
Q. In fact, as we've reviewed earlier this morning, there was continued salvage on some days exceeding 300 delta smelt per day; correct?
A. On several occasions, yes.
Q. There were approximately 1600 delta smelt salvaged by the projects in the 20 days following your sworn statement that the majority of delta smelt now appeared to have moved away from the areas at the south Delta influenced by CVP and SWP pumping; correct?
A. I don't know how many delta smelt there were, but that seems to me to be about the right number.

Q. About 1600?
A. About 1600.
Q. That's three times more delta smelt than were salvaged during the 20 days before your declaration; does that sound right?
A. Based on the curtailment, that does sound right.
Q. Dr. Hanson, you advertise your services as a professional expert witness; do you not?
A. That is one of the services that I provided, yes.
Q. It's one of the services listed on a home page for your company; correct?
A. Correct.
MR. WALL: One moment, Your Honor, I'm about done.
THE COURT: Thank you.
MR. WALL: We have nothing further on our cross-examination, Your Honor.
THE COURT: Thank you, Mr. Wall.
Mr. Maysonett, do you have any questions?
MR. MAYSONETT: Just a few brief questions, Your Honor.

CROSS-EXAMINATION

BY MR. MAYSONETT:
Q. Good morning, Dr. Hanson.
A. Good morning.
Q. During your testimony, you talked briefly about a

temporary physical intertie.
A. I did.
Q. I want to ask you a few questions about that. Have you put forward any proposal for how that temporary physical intertie would be constructed?
A. I have not.
Q. And you suggested that it might be constructed out of pumps and a pipe or some sort of temporary canal; is that correct?
A. Those are just possibilities.
Q. But you haven't conducted any engineering analysis of how this might be done?
A. Absolutely not.
Q. And as a result, do you have any idea how much such a project might cost?
A. I have no idea.
Q. Or how long it might take to complete it?
A. No, I don't.
Q. And I believe you acknowledged that there might be certain obstacles in the construction of such a temporary physical intertie. Can you explain what those would be?
A. There are a variety of potential obstacles. For example, it may need to comply with CEQA and NEPA. There are sensitive habitats within this area. There's the potential that construction activity could disrupt other wildlife species.

All of those factors would need to be taken into consideration as well as a more refined design engineering evaluation and assessment of the ability of this temporary intertie to actually operate the way it was intended.

MR. MAYSONETT: Those are all the questions I have for Dr. Hanson, Your Honor.

THE COURT: Thank you. Mr. Lee, do you wish to question?

MR. LEE: Yes, I do, Your Honor.

THE COURT: You may proceed.

CROSS-EXAMINATION

BY MR. LEE:

Q. Dr. Hanson, are you familiar with the plaintiffs' action number four?

A. Yes. Yes, I am.

Q. All right. Are you familiar with the rationale and sources behind the plaintiffs' action number four?

A. Yes, I am.

Q. Was one of those rationales the Delta Smelt Working Group notes?

A. It was the Delta Smelt Working Group notes, referring to the analyses that Dr. Pete Smith had provided.

Q. So it would be your testimony that the Delta Smelt Working Group notes, in fact, relied upon Figure 8, the Pete Smith graph that is contained in Dr. Swanson's declaration of July

23rd, 2007?

MR. WALL: Objection.

THE COURT: The grounds?

MR. WALL: It's argumentative.

THE COURT: Overruled. You may answer the question. You don't have to accept the premise of the question.

THE WITNESS: I wasn't a party to those meetings, but based on the working group notes, that is my understanding.

BY MR. LEE:

Q. Is the -- what is the averaging period used by Dr. Smith in Figure 8 to determine Old and Middle River flows?

A. Dr. Smith averaged over the January and February period of each year.

Q. Is that a larger averaging period than used to determine Old and Middle River flows for Exhibits B and C of the -- contained in the Jerry Johns declaration?

A. In Exhibits B and C, it was limited to a one-month period, January and February separately.

Q. Thank you. Dr. Hanson, are you familiar with the State Water Contractor Exhibit O?

A. Yes, I am.

Q. Could you explain what information is displayed on this graph?

A. This is a graph that we compiled using data for 1996. And what it presents is a histogram form of Old and Middle River

flows by day beginning on January 1, 1996 and continuing through the end of February. The date is going across horizontally. The magnitude of flow and Old and Middle River is vertically. Values above zero are positive flows, reverse flows in Old and Middle River are designated by negative values. These are reported in cfs.

Q. Could you now please look at Figure 8 on page 12 of the July 23rd, 2007 declaration of Dr. Swanson. I'm going to try to put it up on the Elmo.

Do you -- can you identify Figure 8?

A. This is Figure 8 from Dr. Swanson's declaration. This shows the relationship that Dr. Smith developed between Old and Middle River flows over the period from January through February and combined -- he says "fish," I assume that's delta smelt -- salvage at the SWP and CVP export facilities.

Q. Now, comparing the two exhibits, does the, quote, "combined Old and Middle River flow data" in Figure 8 of the Swanson declaration for 1996 reflect the average of the daily Old and Middle River flows expressed in State Water Contractor Exhibit O?

A. It does not. The Old and Middle River flow for 1996 in Figure 8 appears to be about minus 5,000 cfs or so. In the actual daily values, they ranged from almost minus 10,000 cfs to over a positive 4,000 cfs. So there's much more variation in the daily reverse flow measurements than reflected by this

1996 data point in Figure 8.
Q. Thank you. Are you familiar with the Old and Middle River flow limits in the State Water Contractors tier two proposal?
A. Yes, I am.
Q. Would the State Water Contractor tier two proposal have authorized the negative flows in 1996 for Old and Middle River for the month of January as described in State Water Contractor Exhibit O?
A. They would not have. They would have limited it to a minus 6,000 cfs.
Q. Are you familiar with the Old and Middle River flow limits in the US Fish & Wildlife Service proposal?
A. Yes, I am.
Q. Would the US Fish & Wildlife Service proposal have authorized the 1996 negative flows for the month of January as described in State Water Contractors Exhibit O?
A. They would not have. They would have limited that reverse flow to an average of minus 4500 with a not to exceed minus 5,000 cap.
Q. All right. I would like you to take a look now at plaintiffs', I believe it is Exhibit 19. I'm going to put it up on the Elmo. Please look at Plaintiffs' Exhibit 19, which I believe is identified the CVP and State Water Project salvage and monthly Old and Middle River flows for water years 2000 and 2002. It should be on the Elmo.

A. I can see it on the Elmo.
Q. Okay. Yesterday there was some discussion about the graph for the period December 1999 through March 2000. What is the peak take -- when is the peak take occurring under this graph for that period?
A. For that time period, the peak delta smelt salvage occurred, it appears, in the second and third weeks of February.
Q. Now I would like you to take a look, if you could, at Exhibits B and C of the July 9th, 2007 declaration of Jerry Johns. I believe that's Plaintiffs' Exhibit 18.
THE COURT: Before you do that, we're going to take a recess. We're going to stand in recess until 15 minutes after ten.
(Recess.)
THE COURT: Mr. Lee, you may proceed.
MR. LEE: Thank you, Your Honor.
Q. I would like, Dr. Hanson, for you to take a look at Plaintiffs' Exhibit 18, which I believe has been marked but not introduced. If you don't have a copy, I have a copy here. I've tried to put it on the Elmo, but it's not going to precisely work. May I approach the witness?
THE COURT: Yes, you may.
BY MR. LEE:
Q. Would you please look at Exhibits B and C of the July 9th,

2007 declaration of Mr. Jerry Johns.
A. I have Exhibits B and C.
Q. Do Exhibits B and C divide up the analysis of projected -- of project salvage in Old and Middle River flows into separate months of January and February?
A. Yes, they do.
Q. Could you please look at the 2000 data point in Exhibit B.
A. All right.
Q. Have you focused the 2000 data point for Exhibit B?
A. I see that.
Q. Could you perhaps identify where that is on this graph?
A. That data point appears to be at about a minus 7400 cfs in Old and Middle River with a corresponding SWP/CVP combined salvage of about 800 delta smelt.
Q. Is the negative 7400 cfs within the range of the authorized flows for Old and Middle River under the US Fish & Wildlife remedy proposal?
A. It is not.
Q. And why is that?
A. Because the peak target for the Fish & Wildlife Service proposal at this time period is minus 4500, not to exceed 5,000.
Q. Is the negative 7400 cfs flow within the range of the authorized flows for Old and Middle River under the State Water Contractors remedy proposal?

MR. WALL: Objection. Incomplete hypothetical. Doesn't state whether we've exceeded the pre-determined cap on exports that would trigger the requirement of the finding of immediate jeopardy, risk of jeopardy before tier two would continue under Dr. Hanson's proposal.

THE COURT: The question does appear to be incomplete. Are you able to answer the question in its present form?

THE WITNESS: I can answer the question, yes, sir.

THE COURT: All right. I'm going to overrule the objection. That can be gone into on cross. If you need to explain your answer, you may.

THE WITNESS: Assuming that tier two actions are still in effect, this 2000 data point would have exceeded our minus 6,000 cfs upper limit on Old and Middle River flows.

BY MR. LEE:

Q. Would you please look at Exhibit C of the Jerry Johns declaration.

A. I have that.

Q. What is the negative flow rate for Old and Middle River displayed for February 2000 in Exhibit C?

A. It looks to be about 6200 cfs, minus 6200 cfs.

Q. Is negative 6200 cfs within the range of the authorized flows for Old and Middle River under the US Fish & Wildlife proposal?

A. No, it is not.
Q. Is the negative 6200 cfs within the range of authorized flows for Old and Middle River under the State Water Contractors proposal?
MR. WALL: Objection. Incomplete hypothetical. Same objection.
THE COURT: All right. Why don't you add the predicate since the witness had to assume it in his answer. That the tier two measure's in effect.
BY MR. LEE:
Q. Assuming that the tier two measures are in effect under the State Water Contractor proposal, is the negative 6200 cubic feet per second within the range of the authorized flows for Old and Middle River under the State Water Contractors proposal?
A. No, it would exceed our maximum Old and Middle River flow of minus 6,000 cfs.
Q. Dr. Hanson, I'm going to ask you to look again at Figure 8 on page 12 of the July 23rd, 2007 Swanson declaration. That would be Plaintiffs' Exhibit 11. I believe I can put it on the Elmo.
Have you located Figure 8?
A. Yes, I have.
Q. Does Figure 8 combine Old and Middle River flow data for January and February?

A. It does combine January and February Old and Middle River flows.
Q. Does Figure 8 include a data point for the year 2000?
A. Yes, it does.
Q. What is the negative flow at Old and Middle River for the 2000 data point as displayed on Figure 8 on page 12 of the July 23rd, 2007 Swanson declaration?
A. It appears to be about minus 7,000 cfs.
Q. Is negative 7,000 cfs within the range of the authorized Old and Middle River flows under the US Fish & Wildlife Service proposal?
A. It is not.
Q. Assuming tier two under the State Water Contractor proposal is triggered, is negative 7,000 cfs within the range of authorized Old and Middle River flows under the State Water Contractor proposal?
A. No, it is not. It exceeds our minus 6,000 cfs cap.
Q. In your professional opinion, Dr. Hanson, does splitting the data in Exhibit B and C between January and February for the year 2000 in any way distort the 2000 data?
A. For the year 2000, the same decisions would have been made under either circumstance.
MR. LEE: Your Honor, I have no further questions.
THE COURT: Thank you very much. Mr. O'Hanlon.
MR. O'HANLON: Yes, Your Honor, I have some

questions.

THE COURT: You may question.

CROSS-EXAMINATION

BY MR. O'HANLON:

Q. Good morning, Dr. Hanson.

A. Good morning, Mr. Hanson.

Q. I am Daniel O'Hanlon I represent the San Luis and Delta-Mendota Water Authority and the Westlands Water District.

Now, you agree that the decline of delta smelt is due to multiple factors; correct?

A. Yes, I do.

Q. What are those factors?

A. There are a variety of factors that have been identified. They include exposure to toxics and pollutants. Predation mortality. The potential for entrainment at a wide variety of currently unscreened water diversions located throughout the Delta. Entrainment at the SWP and CVP export facilities. Changes in hydrodynamics within the estuary.

Food availability has been identified as a key factor in terms of the reduction in nutrients, phytoplankton and zooplankton, within the estuary that may be related to the introduction of Corbula and the abundance of Corbicula as well as other exotic species and other factors.

Q. And you have not tried to quantify the relative

contribution of each factor; have you?
A. I have not.
Q. Now, there is quite a bit of data in this estuary regarding operations of the Central Valley Project and the State Water Project; correct?
A. Yes, there is.
Q. And we do have a record of surveys going back to 1967, in the case of the fall midwater trawl; correct?
A. Correct.
Q. Are you aware that Dr. Manly, Dr. Bryan Manly, has found that exports and flows have a statistically significant but small effect on delta smelt spawning abundance?
A. I was aware of that finding.
Q. Have you reviewed that analysis?
A. Not in detail, no.
Q. If there were a strong causal relationship between project operations and delta smelt abundance, wouldn't you expect that to show up in the statistical analysis?
MR. WALL: Objection as to form. Vague.
THE COURT: What is the infirmity that you identify in the question?
MR. WALL: Strong causal relationship.
THE COURT: You understand the terms used?
THE WITNESS: I believe I do, at least in statistical terms.

THE COURT: All right. Then limit your answer. Do not give any legal opinion. Limit your answer to your own expertise and tell us what you mean under -- I should say what you understand the term "strong" to mean.

THE WITNESS: Typically a strong relationship would be expressed by a high degree of statistical significance and in most cases, a high R-squared value.

THE COURT: All right. Now you may answer the question. You can read it back.

(Record read as requested.)

THE WITNESS: If there were a strong signal and relationship between SWP and CVP export operations and the population abundance of delta smelt, assuming that there is a strong causal relationship, then those analyses that cover a wide range of water year types and operations, I would expect would be able to detect that relationship.

BY MR. O'HANLON:

Q. Now --

THE COURT: What is your opinion --

THE WITNESS: My opinion, Your Honor, is that state --

THE COURT: Let me complete my question.

THE WITNESS: Please.

THE COURT: If we'd like to know your opinion at trial, it would be best if we identify the subject.

THE WITNESS: Please.

THE COURT: What is your opinion about the causal effect of project operations on the abundance of delta smelt?

THE WITNESS: Your Honor, I think that the projects have a variable influence on delta smelt abundance. I think in some water year types and under some operating conditions, particularly when delta smelt are located in the central and southern part of the Delta, I think the water project operations can have a significant and, in some instances, a very strong effect on the numbers of delta smelt as reflected by salvage.

In other water year types, typically those reflected by wetter conditions, when delta smelt are located further downstream in Suisun Bay or in the lower Sacramento River where they're geographically removed from the effects of the water projects, then I think under those circumstances, the effects are minimal, if any.

THE COURT: Thank you very much. You may proceed.

MR. O'HANLON: Thank you, Your Honor.

Q. Now, Dr. Hanson, the measures that you have proposed are intended to reduce entrainment at the export pumps; is that correct?

A. They are.

Q. And Dr. Swanson's proposals, likewise, contain measures intended to reduce entrainment at the export pumps?

A. They do.
Q. And the same is true for the Fish & Wildlife matrix actions; correct?
A. That is also correct.
Q. Now, we do have salvage data at the export pumps for many years; correct?
A. Correct.
Q. All right. And we have the fall midwater trawl data going back to 1967; correct?
A. Correct.
Q. Have you reviewed the salvage data and the fall midwater trawl data to determine whether, in years of high -- years of high entrainment produce a low Fall Midwater Trawl Survey abundance number?
A. I have certainly reviewed results of many of those analyses. I haven't done that specifically by myself in the last year or so.
Q. Have you done any statistical analysis to explore that relationship?
A. In the past years, I have. But not in recent years.
Q. Are you aware of any --
THE COURT: Why have you not done it in recent years?
THE WITNESS: In part, Your Honor, we've been focusing not so much on the relationship between exports and salvage, more on the fact of what could be done to reduce that

relationship. What are the kinds of protective and preventative measures and how do they fit within the context of these other factors affecting delta smelt.

So rather than a retrospective review, we have been primarily focused on a prospective what should we be doing in the future.

THE COURT: Thank you.

BY MR. O'HANLON:

Q. Dr. Hanson, are you aware of any statistical analysis that shows that the level of entrainment at the project pumps has a significant effect on delta smelt abundance as measured by the subsequent fall midwater trawl?

A. I have seen some statistical relationships that report that finding.

Q. All right. Would that be Dr. Swanson's analysis?

A. They would be.

Q. Are you aware that Dr. William Miller did an analysis of that relationship and found no statistically significant relationship?

A. I have been told that, but I haven't reviewed those results.

Q. All right. So in connection with preparing your proposals, you did not review that analysis?

A. I did not.

Q. All right. You testified -- and correct me if I'm

wrong -- that the distribution of delta smelt larvae and juveniles can vary from year to year?

A. It does vary from year to year.

Q. And in some years, a higher proportion of the population may end up in the central Delta and therefore be more vulnerable to entrainment at the pumps?

A. That is correct.

Q. All right. And your measures are intended, at least in part, to limit pumping more when there is a higher portion of the population near the pumps; correct?

A. Correct.

Q. Have you looked at years when the population was close to the pumps to determine whether in those years entrainment had a significant effect on the subsequent fall midwater trawl index?

A. I have not.

Q. Have you done any statistical analysis of that relationship?

A. I have not.

Q. Do you know -- strike that.

Are you aware that Dr. Miller did do such an analysis and found no statistically significant relationship between salvage and the fall midwater trawl even in years when the population was close to the pumps?

A. I am aware that Dr. Miller has been investigating those

relationships for the past several years and he and I have had extensive discussions about that. But I haven't reviewed his latest analyses.

Q. Do you -- and I believe you testified earlier that limitation of food for delta smelt is a factor in its decline?

A. It does appear to be an important factor, among several.

Q. Have you looked at the data collected by the Department of Fish & Game regarding the location and abundance of zooplankton and then compared that data with abundance data for delta smelt?

A. I'm aware that those data exist. I've had discussions with Dr. Miller and Dr. Mongan about that, but I have not done any independent analysis.

Q. You're aware that Dr. Miller has evaluated that data and found a very strong relationship between the distribution of the delta smelt and the zooplankton and the subsequent fall midwater trawl index?

A. I have seen those results, yes.

Q. Are there any --

THE COURT: What is your opinion about those results?

THE WITNESS: My opinion, Your Honor, is that the co-occurrence of food supply and subsequent growth and survival of delta smelt is an important component. The San Francisco Bay-Delta Estuary is characterized by relatively low productivity when compared to other estuaries around the

world.

And delta smelt, particularly in their larval stage, are very small, have high food requirements and, by random chance need to encounter a sufficient number of zooplankton to meet their metabolic needs. If zooplankton densities are substantially reduced, just the opportunity for them to encounter a sufficient number of prey organisms to meet their needs may not be met.

THE COURT: Thank you. And you said that you had discussed -- you didn't say at length, but you had discussed with Mr. Miller his statistical studies where he concluded that there was no statistical significance in the relationship between delta smelt abundance and salvage and export operations in the pumps. What is your opinion on that subject?

THE WITNESS: My opinion on that subject is two fold, Your Honor. One is that I have no reason to believe that the statistical analyses that Dr. Miller has prepared are not true and valid and reflect the low significance of that salvage mortality to the population.

On the other side, Your Honor, the fact that we are salvaging delta smelt represents a source of mortality to this population. And one of the approaches that's being made, given the low population abundance, is to identify those sources of mortality that we know of and to try and reduce

those.

My feeling is that we have such a complex estuary with so many interacting variables that change from year to year and within years, that it's difficult to rely solely on statistical analyses. I think we're at a point where we need to say do we have a substantial source of mortality and is there something we can do to help reduce that.

THE COURT: Thank you very much.

BY MR. O'HANLON:

Q. Dr. Hanson, there have been many questions in this proceeding about the relationship between reverse flows and salvage or entrainment.

A. There have been.

Q. And there have been two analyses primarily referred to. One is the Pete Smith analysis that was described in Dr. Pete Smith analysis -- excuse me, described in Dr. Swanson's declaration. And another was a -- another analysis included in Mr. Johns' declaration. Correct?

A. That is correct.

Q. Do either of those analyses include a variable for abundance in the particular year in the analysis?

A. They do not.

MR. WALL: Objection. That's vague.

THE COURT: Well, the witness obviously understood the question. Explain to us what you mean by your answer.

THE WITNESS: As we discussed on cross-examination, Your Honor, the estimates that were prepared that were used in these two analyses relied exclusively on averaging salvage at the SWP and CVP and relating that to average Old and Middle River flows. They did not take into consideration the population abundance or its distribution that occurred with any of those individual data points, is my understanding.

BY MR. O'HANLON:

Q. And wouldn't the level of entrainment also be influenced by the abundance of delta smelt within the year?

A. We think that it certainly would. As abundance goes up, we would expect higher levels of entrainment to occur.

Q. And wouldn't the level of entrainment also be influenced by the distribution of the delta smelt in a particular year?

A. Absolutely.

Q. And those analyses don't include those variables; correct?

A. They do not.

Q. I'd ask you to please refer to Plaintiffs' Exhibit Number 11, which is Dr. Swanson's declaration of July 23rd. And I'd like to ask you to refer to Exhibit V as in Victor to that declaration. These are the Delta Smelt Working Group notes that Mr. Wall had asked you a few questions about.

MR. WALL: Counsel, do you have the page number?

MR. O'HANLON: Yes, it is 16 of 41 within that particular document.

THE WITNESS: I have that.

BY MR. O'HANLON:

Q. On that page, there's a column "biological basis for the next 12 months." Do you see that?

A. Yes, I do.

Q. And there are numbers zero through five describing different bases for evaluating potential actions; correct?

A. Correct.

Q. And the higher the numbers go, the stronger the presumed biological basis for the action; correct?

A. Correct.

Q. The first, lowest level of justification is zero, "none." Correct?

A. Correct.

Q. The next, number one, is "reasonable biology"; correct?

A. Correct.

Q. Number two is "supporting pattern in data." Correct?

A. Correct.

Q. Number three is "correlation present." Correct?

A. Correct.

Q. All right. Now, "correlation" doesn't necessarily mean causation; correct?

A. It does not.

Q. All right. Four is "some causation known." Correct?

A. Correct.

Q. And then five, the highest basis, is "strongly supported by evidence." Correct?
A. Correct.
Q. All right. So in the view of the Delta Smelt Working Group, as reflected in these notes, reasonable biology can include a circumstance where there is no supporting pattern in the data, there is no correlation present, some causation isn't known and it is not strongly supported by the evidence. Is that correct?
MR. WALL: Objection. Best evidence.
THE COURT: He has changed the -- by putting negatives in front of them, and so the best evidence objection isn't a valid one. But if you understand the question -- do you understand the question?
THE WITNESS: I'd like to have it repeated, Your Honor.
THE COURT: All right. Let's read it back, please.
(Record read as requested.)
THE WITNESS: That is correct.
MR. O'HANLON: Thank you, Dr. Hanson. I have no further questions.
THE COURT: We are back, Mr. Wilkinson, to redirect.
MR. WILKINSON: Yes, Your Honor. I have a few.
THE COURT: Is there going to be redirect?
MR. BUCKLEY: No, Your Honor. No questions.

THE COURT: Thank you, Mr. Buckley. I thought you were doubling up. That's why I didn't ask you.

MR. BUCKLEY: Yes, we are.

THE COURT: Thank you. And it's appreciated.

REDIRECT EXAMINATION

BY MR. WILKINSON:

Q. Good morning, Dr. Hanson.

A. Good morning.

Q. Yesterday you were asked a few questions about the declaration of Mr. Armin Munevar in connection with your tier one measure; do you recall that?

A. I do recall that.

Q. Were there other people that you asked to help with the Particle Tracking Model studies in connection with the development of your tier one measure besides Mr. Munevar?

A. There were. There were a whole team of individuals who were participating in the discussions regarding the formulation of these proposals. They include modeling experts and individuals familiar with state and federal water project operations.

Q. To your knowledge, did these other individuals use the particle tracking model to show particle movements in months other than January and February?

A. My understanding is that modeling was done in other months as well as in other water year types using both the CALSIM

model as well as the DSM2 and Particle Tracking Model.
Q. More than one year was examined; is that correct?
A. That is my understanding, yes.
Q. From a physical standpoint, Dr. Hanson, does it matter what month the Particle Tracking Model was used?
A. From the standpoint of looking, say, at the behavior of sub-adult or adult delta smelt, it would. But from the standpoint of simply looking at planktonic or neutrally bouyant particles, whether they be larval fish or, you know, the suspended sediments associated with turbidity, it's independent of the month.
THE COURT: Is this because of the size of the fish and their volitional movement?
THE WITNESS: It is. It's a physical process when they're planktonic, Your Honor.
THE COURT: Okay.
BY MR. WILKINSON:
Q. Did the work by Mr. Munevar and these other individuals, Dr. Hanson, indicate what the water supply impacts of your proposed tier one, tier two, tier three measures is?
A. As part of some of the CALSIM modeling, there were estimates of water supply impacts associated with various actions.
Q. And what were those?
A. My recollection -- and I didn't --

MR. WALL: I'm going to object to this. Is there a standing objection that the water supply impacts are irrelevant to this proceeding?

MR. WILKINSON: Well, we can argue that, Your Honor, but --

THE COURT: Yes. The objection is made, I'm going to overrule the objection in part. However, is this not beyond the scope of cross? That's the more germane concern. We haven't discussed this subject at all with this witness.

MR. WILKINSON: I understand that. We were discussing the Particle Tracking Model and I thought that Mr. Wall had opened up that subject. And we were simply trying to indicate what those studies show.

THE COURT: Well, you have another witness that is going to do this; don't you?

MR. WILKINSON: We'll hold it for that witness. That's fine.

THE COURT: I don't think it's that related to particle tracking. Thank you.

BY MR. WILKINSON:

Q. Dr. Hanson, you were also asked yesterday whether anyone at Fish & Wildlife Service, the Department of Water Resources or the Department of Fish & Game had accepted your tier one proposal; do you recall that?

A. I do recall that.

Q. Are any of these agencies continuing to discuss your tier one measure, to your knowledge?
A. We have had discussions with Fish & Wildlife Service and the Department of Water Resources about continuing investigations, additional modeling and an ongoing dialogue about these actions.
Q. Your tier --
A. That extends beyond these proceedings.
Q. Your tier one measure is aimed in part at turbidity events; is that correct?
A. That is correct.
Q. Is it your understanding that the Fish & Wildlife Service Action Matrix also has turbidity triggers as part of it?
A. It does have a turbidity trigger.
Q. And do you recall where those are found?
A. Those are the late winter actions beginning on December 25th and extending through February, I believe, is the turbidity trigger.
Q. Have any of the agencies we've just described, Fish & Wildlife, Fish & Game, DWR, rejected the concept of your tier one measure?
A. To my knowledge, no one has rejected it. We are continuing to discuss it and evaluate it.
Q. On cross-examination, Dr. Hanson, it was suggested to you that salvage was a continuing or continuous event. Do you

recall that?
A. I do recall that.
Q. Let me show you -- may I approach, Your Honor?
THE COURT: Yes, you may. Can you turn it around so counsel can see it, too, please.
MR. WILKINSON: Absolutely.
Q. Dr. Hanson, I've handed you a copy of Plaintiffs' Exhibit 19. Do you recognize that document?
A. Yes, I do.
Q. If you look at the histograms that are shown for the three years indicated on Exhibit 19, does it appear to you that salvage is a continuous event or is it episodic?
A. Salvage is sporadic during portions of the winter. And then there are peaks in salvage that occur.
THE COURT: Is there a time when it doesn't occur?
THE WITNESS: The time that it does not occur, Your Honor, is typically during the summer months. And our hypothesis is that during those summer months, water temperatures within the central and southern Delta are elevated and the delta smelt tend to be distributed further downstream in Suisun Bay in the lower Sacramento River.
BY MR. WILKINSON:
Q. Dr. Hanson, if we look at the top figure on Plaintiffs' 19, would you describe for us how your tier one, tier two, tier three measures would be applied to the salvage that is

shown on the top figure, which is for water year 2000, as I understand it. December, 1999 to March, 2000.

Beginning at the left-hand side of the chart, how would your tier one, tier two, tier three measures apply?

A. Beginning at the left-hand side, assuming that we had a distribution similar to this, tier one activities would have begun December 1 with the occurrence of delta smelt in the salvage in early December. That would have triggered tier two. Tier two would have remained in effect through the early part of February as delta smelt salvage increased. That would have triggered tier three. And that would have been in effect -- if this histogram would have continued, it would have been in effect basically throughout the remainder of February into March.

Q. Under your tier two measure, it would have been triggered -- that would have been triggered approximately when?

A. That would have been triggered, it looks from this occurrence, that there were a few delta smelt that showed up in early December.

Q. Now, your tier two measure has a range associated with it of negative 1,000 cfs to negative 6,000 cfs; correct?

A. It does.

Q. Where would you likely be in your tier two measure when you initially began to detect delta smelt salvage?

A. Under the occurrence of very low levels of delta smelt salvage, we would likely be near the minus 6,000 cfs portion of the range.

Q. And under Dr. Swanson's proposed measures, what would the target flow be at that time?

A. Target flow at this time would have been minus 3500 cfs.

Q. And the difference is about 2500 cfs?

A. Correct.

Q. That's about 5,000 acre feet of water a day?

A. Correct.

Q. That's 150,000 acre feet of water a month?

A. Correct.

Q. All right. Let's go down to the chart for December 2000 to March 2001. Can you walk us through the application of your tier one to tier three measures to that year?

A. This would have been a similar occurrence. Our tier one, if it had reflected these distributions, would have begun December 1st. In early December, again, there were low numbers of delta smelt that were reported in the salvage. That would have triggered tier two.

Tier two would have been in effect through, it appears, the end of the first week of February. And then with the rapid increase in delta smelt salvage beginning in about the end of the first week in February, that would have triggered our tier three.

Q. And at that time you would have shut the project pumps down for a period of at least four days, if not longer.
A. Assuming that none of our other metrics and none of our other actions precluded achieving this kind of a distribution, that would have been the effect.
Q. In fact, if your tier one measure were successful, would you expect that there would be smelt in the vicinity of the project pumps?
A. Part of our objective for tier one is to avoid the occurrence of delta smelt in this area where they would be vulnerable to salvage.
Q. Over this period in the second or middle chart, from the inception of your tier two measure to the spike in -- roughly into the first week of February, approximately where would you have been in your range of tier two flows?
MR. WALL: Objection. It calls for speculation as to how the Fish & Wildlife Service would decide on the range between minus 1,000 and minus 6,000 cfs.
MR. WILKINSON: What was your --
THE COURT: Do you have sufficient information to answer this question?
THE WITNESS: I can offer my own opinion, Your Honor.
THE COURT: But you cannot speak --
THE WITNESS: I cannot speak for the Fish & Wildlife Service.

THE COURT: Amend the question.

MR. WILKINSON: I'll rephrase the question.

Q. Dr. Hanson, as you would apply your tier two measure, what would your anticipation be of the expected flows that would occur prior to the spike in salvage?

A. Assuming that, based on the order of -- order of magnitude population abundance that these small salvage events that occurs beginning in early December were below the threshold, then we would have been near our 6,000 cfs.

Q. And again, Dr. Swanson's measure during that period of time would provide for a target flow of what?

A. Minus 3500 cfs in Old and Middle River.

Q. You were asked, Dr. Hanson, whether maintaining a net positive westerly flow in the lower San Joaquin River would create a turbidity event that would attract smelt towards the pumps, do you recall that?

A. I do recall that.

Q. Is this likely to occur, this turbidity that was part of the question, in the absence of a storm water event?

A. In the absence of a storm water event, it doesn't appear that it would occur.

Q. Would this be -- this occurrence or potential of occurrence in a storm water event, be an event that would cause you to rethink the application of your tier one measure?

A. It would not make me rethink it. If we would watch that

turbidity event, it would depend on where it was located, whether there was a substantial increase in, say, Sacramento River flow. And so we would watch that occurrence.

And as part of the monitoring, there are additional turbidity meters that are being deployed throughout the Delta to provide us better resolution on where and when turbidity is occurring within the estuary so that we would have that information available.

Q. Dr. Hanson, you were asked a couple of questions also on cross-examination about Dr. Swanson's measure number five.

A. Yes.

Q. Do you recall that?

A. I do recall that.

Q. When is measure five triggered under Dr. Swanson's proposal?

A. Measure five would be triggered during the late winter, early spring period after there was evidence that delta smelt had spawned.

Q. And if the measure five is triggered, flows would drop in Old and Middle River to a target of negative 1500 cfs; is that correct?

A. That is correct.

Q. Does Dr. Swanson's action number five depend upon where the spawning occurs?

A. No. It just has the triggering events.

Q. And based upon past occurrences of spawning, could spawning occur some distance from the project pumps?
A. For example, in 2007, the best evidence we have is that spawning occurred in Cache Slough on the northern part of the Sacramento River within this portion of the Delta.
Q. Approximately --
A. Quite a distance away from the pumps.
Q. I was going to ask you how far is Cache Slough from the pumps at Tracy?
A. I would say it's -- not by river miles, but just general distance, 30 miles or more.
Q. And in the event that the spawning occurs 30 miles from the project pumps, is it your understanding that Dr. Swanson's measure number five would immediately require that flows in Old and Middle River be limited to not more than 1500 cfs negative?
A. My understanding is that if the physical triggers of water temperature or the occurrence of spent adults are detected, that would trigger her action. So yes.
Q. Is that --
A. Independent of its location.
Q. Dr. Hanson, you were also asked about whether elevated levels of salvage could occur at lower levels of flow. And I believe the levels that were provided were negative 4,000 cfs and maybe 2,000 cfs.

A. I do remember that.
Q. Under your tier one, tier two, tier three measures, what would happen if, in fact, elevated levels of salvage occurred at those flows?
MR. WALL: Objection. Calls for speculation on implementation by the federal defendants.
MR. WILKINSON: Do you have an opinion --
THE COURT: Do you understand the question?
THE WITNESS: I do understand the question.
THE COURT: Is it a condition that could occur?
THE WITNESS: It is a condition that could occur.
THE COURT: Overruled. You may answer.
THE WITNESS: Under that condition, that would have triggered our tier three action, the immediate reduction in pumping to minimum levels.
BY MR. WILKINSON:
Q. And that would require consultation at some point?
A. That would not require consultation, that would be based on pre-determined triggers. Because at that point in time, speed and the immediacy of your response is a key criteria in its success.
Q. Dr. Hanson, do you have Exhibit 6 from your declaration?
MR. WALL: Counsel, which declaration?
MR. WILKINSON: This would be State Water Contractor Exhibit G.

Q. Do you have, Dr. Hanson, Exhibit 5 from your declaration of August 13th?
A. Yes, I do. These are the daily records of delta smelt salvage for June, 2007.
Q. Those are actual records of salvage; are they not?
A. These are actual records of salvage.
Q. These are the counts that were actually made at the salvage facilities of the project?
A. No. These are the expanded salvage estimates based on the counts that were made at the facility.
Q. All right. So the number of fish shown here is not necessarily the number of fish actually counted, it's an expanded number; is that correct?
A. Correct.
Q. But the expanded number is based upon protocols that are well accepted?
A. Correct.
Q. During your question --
THE COURT: I don't think we marked this example.
MR. WILKINSON: I don't believe we did, Your Honor. Maybe we should mark this --
THE COURT: It should be marked as part of the examination of the witness. It was on the Elmo. And so this was prepared by Mr. Wall, it should be marked as an exhibit. Plaintiffs' next?

MR. WALL: Plaintiffs' next.
THE COURT: Plaintiffs' 20.
(Plaintiffs' Exhibit 20 was marked for. identification.)
BY MR. WILKINSON:
Q. Dr. Hanson, I put Plaintiffs' Exhibit 20 on the Elmo. Do you recall the questions that you were asked about this particular exhibit?
A. Yes, I do.
Q. Are you familiar with any salvage pattern that looks like this?
A. In the past, there have been peak occurrences of salvage where we have seen an increasing number of fish showing up in the salvage from one day to the next. And that's reflected in some of the peaks in Plaintiffs' Exhibit Number 19.
Q. Are these numbers, to your knowledge, representative of any actual salvage counts?
A. My understanding at the time of the cross-examination is that this was a hypothetical example.
Q. And there were no dates or years or anything provided, other than the assumption that this was a pattern of salvage; is that right?
A. That is my understanding.
Q. Dr. Hanson, I'd like you to take a look at Exhibit 5 to State Water Contractors Exhibit G. I believe your testimony

was that this is the actual salvage count.
A. Correct.
Q. If you turn to the date that begins June 1, '07. And you look down through that to the end of the exhibit. Would you identify for me, please, the occasions, if any, where your tier three measure would be triggered. That's the measure, I understand, that results from a dramatic increase of salvage of ten times the average of the prior days.
A. The first triggering event in June of 2007 would have been based on the salvage monitoring on June 14, June 15 and June 16th. That was the three days. And then on June 17th, there was more than an order of magnitude increase to the 180 delta smelt.
Q. And at that time, then, under your tier three measure, there would be an immediate shut down of the pumps?
A. For a four-day period.
Q. Would you continue.
A. Again, on -- assuming that operations had resumed on the data from June 24th, June 25th and June 26th, the average of those three days was exceeded by order of magnitude on the salvage of June 27th.
Q. And on that date, that would have been an additional four-day shut down of the project pumps?
A. There would have been. And had these records remained as they are, we would have had then 30 and 78 fish on the 28th

and 29th, and then another bump up to 390, which would, I believe, have sent a signal that the curtailment should remain in effect. And that would have been in effect for another four days.

After that time, it appears that salvage declined to a point where no other triggering events would have occurred.

Q. Thank you, Dr. Hanson. You were asked about Exhibit V to Dr. Swanson's declaration. Do you recall that?

A. The Delta Smelt Working Group notes. Yes.

Q. Yes. Is the Delta Smelt Working Group a body that meets frequently? Infrequently?

A. They meet on basically an as-needed basis, which can be very frequently at times when decisions are needed or recommendations are to be made.

Q. Do you recall the date of the Delta Smelt Working Group meeting that is Plaintiffs' Exhibit B? I'm sorry. Exhibit B to the Swanson declaration, which is Plaintiffs' Exhibit 11.

A. It was on July 10th, 2006.

Q. Do you have in front of you, Dr. Hanson, the Delta Smelt Working Group minutes that are attached as Exhibit W to that same declaration?

A. Yes, I do.

Q. Would you take a look -- well, first let me ask: Is that also a set of minutes for the Delta Smelt Working Group?

A. It is for August 21, 2006.

Q. So that working group meeting occurred a little over a month after the working group meeting you were asked about previously; is that correct?
A. Correct.
Q. Would you turn to the second page of that meeting minutes of August 21. And under the heading fall flows, you see that?
A. Yes, I do.
Q. Would you read the third sentence in that paragraph that begins, "The working group"?
A. "The working group is not opposed to this action, but it did not recommend it because 7,000 cfs is not enough flow to detectably change physical habitat quantity/quality for delta smelt and will not likely change overbite clam distribution or abundance (attachment Figure 2)."
THE COURT: You know, before you go on, can you tell me what page you're on? I'm on page -- oh, there it is. It's at the top of 25 of 41?
MR. WILKINSON: I don't have those numbers on my --
THE WITNESS: Correct, Your Honor.
MR. WILKINSON: -- copy, but yes, it's at the top of the page.
THE COURT: The first paragraph of the page.
MR. WILKINSON: Under the italicized heading "Fall flows."
THE COURT: Did you understand this to refer to the

Swanson proposal?

THE WITNESS: No, I understood this to refer to a discussion within the Delta Smelt Working Group about the general concept of a fall action that would be similar to the proposal that Dr. Swanson was making. But I don't know whether it's exactly the same.

THE COURT: Thank you.

BY MR. WILKINSON:

Q. Dr. Hanson, there's a figure referred to in that paragraph of 7,000 cfs. Do you recall the flow that Dr. Swanson proposed?

A. I believe that Dr. Swanson proposed 7,500 cfs for X2 at Kilometer 80.

Q. What was the number again?

A. 7,500 cfs.

Q. Do you have any understanding of whether that additional 500 cfs would change the conclusions that are set forth there?

A. I can't speak for the Delta Smelt Working Group, but I would doubt that that would make a demonstrable effect in this part of the Delta given the tidal dynamics.

Q. If we refer back to the prior page from the one you were just reading, Dr. Hanson, there's a list of -- excuse me -- participants in this Delta Smelt Working Group meeting.

A. Yes.

Q. Do you see that? Do you see that one of the participants

is someone named Matt Nobriga?
A. Yes.
Q. Who is Matt Nobriga?
A. Matt Nobriga is, at this time, a biologist with the California Department of Water Resources.
Q. And is Mr. Nobriga also one of the co-authors of what we have referred to in this proceeding as the Feyrer paper?
A. He was a co-author.
MR. WILKINSON: If I could have just a moment, Your Honor.
THE COURT: Yes, you may.
BY MR. WILKINSON:
Q. Dr. Hanson, I'd like to refer you back to Exhibit 5 of the State Water Contractors Exhibit G, that's your declaration of August 13. That's the chart of counts of salvage.
A. For June, 2007.
Q. Right.
A. Correct.
Q. And Exhibit 6 then goes through July.
A. Yes.
Q. If you look down the columns on the left-hand side, you will see daily total for SWP and CVP. Do you see that?
A. Yes, I do.
Q. Does it appear to you that there's a disproportion in the salvage between the two facilities?

A. There is a disproportion.
Q. That on, for example, June 27th of 2007, the state project pumping plant took 327 delta smelt and the CVP pumping plant took zero. Do you see that?
A. I do see that. And yet if you look over to the right hand column under pumping, Banks pumping on that date was 847 compared to Tracy pumping on that date of 4,254 cfs. So there's a big difference in salvage despite the big difference in exports.
Q. Similarly, if you'd look at June 30th, that same month, it appears that the state project pumping plant took 390 smelt and the Central Valley Project pumping plant again took zero. Do you see that?
A. That is correct.
Q. And what were the relative levels of pumping on those days?
A. On that date, the State Water Project exported at a rate of 1,360 cfs and the Central Valley Project exported at a rate of 4,431 cfs.
Q. So the Central Valley Project pumping plant is exporting at a multiple of the rate of the state project pumping plant; correct?
A. Approximately three.
Q. But the state pumping plant is taking more fish; is that right?

A. 390 compared to zero.
Q. Now, if we look at the map, Dr. Hanson, that I've put up again. Can you show me where the two pumping plants are?
A. The State Water Project export facilities are located in Section A12 at the terminus of Clifton Court Forebay. The CVP export facilities are also located in Section A12 right adjacent to Victoria Canal on the outside of the radial gates to Clifton Court Forebay.
Q. And approximately distance-wise, geographically, how far apart are the two pumping plants?
A. Well, the two pumping plants in and of themselves at that point are maybe a half mile apart. But the functional difference is that the entrance to Clifton Court Forebay is located immediately adjacent to the intake for the Central Valley Project, within a quarter mile or so.
Q. Dr. Hanson, given the proximity of the intakes of the two plants, do you have an opinion as to why, when the Central Valley plant is pumping at a multiple rate of the state plant, that the state plant is taking many more fish?
MR. WALL: Objection. Beyond the scope.
THE COURT: It does. It might be interesting to know, but it does appear to be beyond the scope of the cross.
MR. WILKINSON: Thank you. That's all I have.
THE COURT: I have a question. I want you, for the purposes of my question -- well, let me ask one foundational

question. What has been your activity with regard to the Delta Smelt Working Group?

THE WITNESS: I have not been party to the Delta Smelt Working Group, Your Honor.

THE COURT: You have read their minutes?

THE WITNESS: I have read their minutes and I am a member of the Delta Smelt Recovery Team. And the Delta Smelt Working Group provides input to the recovery team process.

THE COURT: All right. And the Water Operations Management Team, do you have any knowledge of that?

THE WITNESS: I have knowledge of that, but I don't participate in that process.

THE COURT: All right. But you understand the functions of both of those groups?

THE WITNESS: Yes, I do, Your Honor.

THE COURT: All right. I want you to assume, for the purposes of my question, that the present -- what I'm going to refer to as the '04/'05 Biological Opinion, you are knowledgeable about that?

THE WITNESS: Yes, Your Honor, I am.

THE COURT: You've reviewed it, studied it --

THE WITNESS: I have.

THE COURT: -- in the form that it has been declared unlawful. That is the Biological Opinion that I want you to consider.

I want you also to consider, for the purposes of my question, that the take limits that are established in that Biological Opinion exist.

I want you to assume, for the purposes of my question, that the Delta Smelt Remedial Management Protocol, the DSRAM, as they call it, action also is in existence. And.

I want you to assume for the purposes of my question -- you've been familiar with the actions that have occurred over the period from the time the Biological Opinion petition, the finding of no jeopardy to the present?

THE WITNESS: Yes, I have.

THE COURT: I want you to consider -- assume that the species is in its current condition as you have described it.

THE WITNESS: Yes, Your Honor.

THE COURT: Relative to its lack of abundance.

In your professional opinion, would it be prudent -- and the subject is prudent with respect to the jeopardy, if any, to the species and to its critical habitat, if this whole set of circumstances that I have just described to you is left in place with no action whatsoever?

Ask you what is your opinion of what the effect of doing that from a scientific standpoint and functional standpoint, from what you know, that the Fish & Wildlife Service operates. Can you answer what effect you believe that would have on the threat to the species and its critical

habitat?

THE WITNESS: Your Honor, under those circumstances and given how that has been administered in the past --

THE COURT: That's what I want you to assume.

THE WITNESS: My assumption is that that would not be adequately protective given the current status of the delta smelt population to provide me the comfort that it would do the job of providing the necessary level of protection over the interim period.

THE COURT: And what reason or reasons do you have for that opinion?

THE WITNESS: I think the take limits that are embodied in that Biological Opinion are far outdated given the current status of the delta smelt population. I think that's based on the numeric take limits. I think the fact that there are not triggers to implement specific actions and response to events; and I think the fact that there's a relatively long and protracted decision-making process that has in the past resulted in either delays or dilution of some of the actions diminish the ability of that particular set of actions to provide an adequate level of protection given today's status of delta smelt.

THE COURT: Thank you very much.

Do you wish to cross-examine, Mr. Wall?

MR. WALL: Just a few questions, Your Honor.

THE COURT: Make it as few as you can, please.

RECROSS-EXAMINATION

BY MR. WALL:

Q. Dr. Hanson, I'm going to ask you to look at Plaintiffs' 19. It says "CVP and SWP Salvage in Old and Middle River Flows."

A. I have that.

Q. Could I ask you to look at the top figure, which provides a relationship for December 1999 through March 2000.

A. Yes.

Q. Can you tell us at what point on that figure your tier three action would be triggered?

A. I can give you my opinion about what point that action should be triggered. I cannot give you an opinion about where the Fish & Wildlife Service might trigger it or what we might come up with triggers in the interim.

Q. It does not appear that there is a day in which salvage exceeds the three-day previous average by an order of magnitude until we get to that rather dramatic high peak in mid February; correct?

A. That is correct. And we're not proposing the three days. It was simply a suggestion for consideration.

Q. And by that date where you get the ten time jump over the previous three-day average, you would have had perhaps a couple of weeks of take on a daily basis between 20 and 150 or

so fish per day; correct?
A. If you were willing to accept that level of take, that would have occurred, yes.
THE COURT: Well, where would your action level be?
THE WITNESS: Under this circumstance, if we had a population that was substantially lower, then we wouldn't necessarily have gone with the three-day running average in the order of magnitude. That would be a decision that would be made by the Fish & Wildlife Service in collaboration with others. And there are a whole variety of triggers that could potentially be used and implemented to trigger our tier three action.
THE COURT: But I was understanding that you were proposing these as something tangible --
THE WITNESS: We're proposing --
THE COURT: -- by way of an interim operating regime.
THE WITNESS: We're proposing, as a tangible operating regime, the tier three action. The implementation and the trigger itself has not yet been defined, Your Honor.
THE COURT: That would be up to Fish and Wildlife?
THE WITNESS: That would be up to Fish & Wildlife based upon the best available information at the time. And the trigger itself would be fine-tuned and tailored to the conditions that were occurring at the time.
THE COURT: And without definition, what is our

confidence level that they will apply the trigger?

THE WITNESS: I personally have high hopes that they would apply those triggers and, given the sensitivity that has evolved around these proceedings, I think that they would certainly scrutinize those conditions and --

THE COURT: But there are no triggers. Those would have to --

THE WITNESS: We have not proposed any specific triggers, no.

BY MR. WALL:

Q. Dr. Hanson, you did propose a trigger of ten times jump in salvage over the three-day running average; is that correct?

A. We proposed that as a trigger that would be evaluated. Not as a trigger that would be required.

MR. WALL: Your Honor, we have Plaintiffs' 20, which is this paper on which I scrawled some numbers.

THE COURT: Yes.

MR. WALL: And I'm hoping we can have that admitted not for the truth of the matter asserted --

THE COURT: Yes, it's demonstrative. Any objection?

MR. WILKINSON: I think it lacks foundation.

THE COURT: Well, he actually stated where he got those figures when he was drawing the figures on the piece of paper. You can repeat it again.

MR. WALL: Your Honor, I was actually making it as a

hypothetical.

THE COURT: Hypothetical.

MR. WALL: If this occurred, would that --

THE COURT: All right. The basis, the legal ground of the objection?

MR. WILKINSON: No foundation.

THE COURT: All right. I'm going to overrule the objection. This is a demonstrative exhibit with hypothetically assumed figures to test the expert's analytical ability and therefore I am going to, because it completes the record, admit Exhibit 20 into evidence.

(Plaintiffs' Exhibit 20 was received.)

BY MR. WALL:

Q. Dr. Hanson, could I ask you to turn to plaintiffs' 11, which is the July 23rd declaration of Dr. Christina Swanson, and turn to Exhibit W, which Mr. Wilkinson asked you about. Exhibit W begins at the very back, page 23 of 41.

A. I have that.

THE COURT: Let me interrupt you just one second. You may answer.

THE WITNESS: I do have that.

BY MR. WALL:

Q. And if I could direct you to page -- well, I guess it's the second page of the Delta Smelt Working Group notes, which says at the top, "page 25 of 41."

A. Yes.
Q. Dr. Swanson's action calls for a flow of at least minus 7500 cfs in the fall months; correct?
A. It's not a minus, it's --
Q. I'm sorry.
A. -- 7500 cfs.
Q. Outflow through the Delta of 7500 cfs.
A. Correct.
Q. Just checking to see if you're awake.
A. I'm still working on it.
Q. And this portion of the Delta Smelt Working Group notes about which Mr. Wilkinson asked you about discusses a different action which would have a lower outflow; correct?
A. That is correct.
Q. It's your understanding that Dr. Swanson's proposal of minus 7500 cfs, the summary -- let me try that one more time.

It's your understanding that Dr. Swanson's proposal of a 7500 cfs outflow through the Delta is intended to move the X2 point to at least Kilometer 80; correct?
A. That is my understanding.
Q. Now, if you could just flip forward three or four pages to a graph that says "mean September to December X2." Does that graph show an increase in the fall habitat index beginning at about Kilometer 80?
A. It shows basically a general trend of increasing fall

habitat index starting at Kilometer 90 and continuing through about Kilometer 65.

THE COURT: Are the circles where these two values coincide?

THE WITNESS: Yes, Your Honor.

THE COURT: Where they intersect, I guess would be the better word.

BY MR. WALL:

Q. Actually, doesn't it appear, if you look at Kilometer 80 through Kilometer 95, that there's a relatively stable habitat quality relationship?

A. The slope appears to flatten out, yes.

THE COURT: And for the delta smelt, we don't want to get above .2 in the salinity on the Y axis?

MR. WALL: Your Honor, I think the Y axis is not salinity, it's habitat quality.

THE COURT: And what is that?

BY MR. WALL:

Q. Well, Dr. Hanson, do you have an understanding of whether on the Y axis, higher level of habitat quality is better habitat for the delta smelt?

A. That is how habitat quality is identified, yes.

THE COURT: What's it comprised of?

THE WITNESS: It's comprised of a statistical relationship that was using water temperature, Secchi depth or

water transparency and a measure of salinity.

THE COURT: All three?

THE WITNESS: All three.

BY MR. WALL:

Q. And Dr. Hanson, this is based on the work of Feyrer, et al.?

A. Yes, it is.

Q. Where they found a statistically significant relationship between Secchi depth and salinity and habitat quality for delta smelt in the fall; correct?

A. Correct.

THE COURT: Let me ask one more question. Independently, then, this, if you will, habitat quality index doesn't have significance. Here the goal is to have these intersections at the 80 kilometer mark or does it matter?

THE WITNESS: That is the proposal of the plaintiffs, Your Honor, would be to manage the salinity at the 80 kilometer mark with the intent that that would provide improved habitat quality for delta smelt during the fall period.

THE COURT: And how does this graph tell us anything? Because if you have an isolated salinity, this is giving us a figure that is not precise and that essentially is an average of other values, but yet, as I thought I understood, they're trying to keep salinity at or below the two parts per thousand

level at the 80 kilometer mark. And quite frankly, what relevance does this have to anything?

THE WITNESS: The basis of the proposal that I understand, Your Honor, is that they would propose to keep salinity at two parts per thousand at the 80 kilometer mark. This habitat index does include a consideration of salinity, but it also included two other water quality variables.

THE COURT: And that's what I'm missing, quite frankly, because I don't see how it helps us, quite frankly, either understand or accomplish anything because isn't -- if salinity is the goal at that level, isn't what water it's going to take to hold that salinity at or below the two parts per thousand, isn't that the objective?

THE WITNESS: That would be the objective.

THE COURT: All right. So I'm sorry I didn't see this.

MR. WALL: Let me try a couple more questions, Your Honor, and see if we can clarify.

THE COURT: All right.

BY MR. WALL:

Q. Dr. Hanson, is it your understanding that based on this relationship, habitat quality for delta smelt begins to improve when X2 is at 80 kilometers or further downstream?

A. Yes.

Q. And is Dr. Swanson's proposal designed to keep X2 at 80

kilometers or further downstream?
A. That is my understanding, yes.
THE COURT: Anything further?
BY MR. WALL:
Q. Dr. Hanson, is it your understanding that the Central Valley Project salvage facilities are thought to be less efficient at detecting salvage than the State Water Project export facilities?
A. I don't know that there's been any real quantitative comparison, but the CVP facilities are older and my estimation or my opinion is that they may not be as efficient in salvage as the State Water Project.
MR. WALL: Nothing further, Your Honor. I do have Plaintiffs' 20 and I'd like to approach and have it --
THE COURT: Yes, you may. It's been received in evidence.
Mr. Maysonett, any questions?
MR. MAYSONETT: No, Your Honor.
THE COURT: Mr. Lee, any questions?
MR. LEE: No, Your Honor.
THE COURT: Mr. O'Hanlon, any questions?
MR. O'HANLON: No, Your Honor.
THE COURT: Mr. Wilkinson, anything further?
MR. WILKINSON: Just a couple of questions, Your Honor.

FURTHER REDIRECT EXAMINATION

BY MR. WILKINSON:

Q. Dr. Hanson, do you have the figure that Mr. Wall showed you, Figure 2 from Plaintiffs' 11?

A. Yes, I do.

Q. If you look at the scattering of data, can you tell me what the difference in habitat index would be that is shown by this data if the X2 point is at Kilometer 85 instead of Kilometer 80?

A. The mean difference or the range?

Q. The range.

A. At Kilometer 80, I would say that the range, just looking at the graph, is probably from about .1 to .2 habitat index. At kilometer 85, it appears to be at about .6 to 1. -- or .15.

Q. Can you tell me what the difference in abundance of delta smelt would be between those two differences?

A. No, I cannot.

Q. Do you recall whether Mr. Feyrer, in his article, reached any conclusions about the statistical significance of the relationship between salinity and presence or absence of smelt in the vicinity of Kilometer 80?

A. Not specifically in response to Kilometer 80.

Q. Well, let me show you State Water Contractor Exhibit S. Do you have that in front of you?

MR. WALL: Is that "S" as in Sam?

MR. WILKINSON: "S" as in Sam.
Q. This was a chart that had the closed circles and the open circles.
A. Yes.
Q. I think we asked where Kilometer 80 was on that exhibit.
A. Correct.
Q. And was it the case that Kilometer 80 is in the area that is surrounded by open circles?
A. Yes, it is.
Q. And what do those open circles represent?
A. That there was a non-significant relationship between the index of habitat quality based on all three of the water quality parameters over time.
Q. Dr. Hanson, do you have an opinion as to whether, based upon the Feyrer article, there is substantial scientific support for imposing an X2 requirement in the fall of this year on the operation of the projects?
A. I think there's high uncertainty as to whether there would be biological benefit at this time of managing, say for Kilometer 80 versus Kilometer 85. I just don't think we have the resolution at that level.
MR. WILKINSON: Thank you. That's all I have.
THE COURT: Anything further?
MR. WALL: Nothing further, Your Honor.
THE COURT: Any attorney have anything further for

the witness?

May this witness be excused?

Thank you, Dr. Hanson.

THE WITNESS: Thank you, Your Honor.

THE COURT: You may step down. You are excused.

All right. Mr. Wilkinson, does that conclude your presentation?

MR. WILKINSON: It does, Your Honor.

THE COURT: All right. Mr. O'Hanlon, do you have a witness?

MR. O'HANLON: Yes, Your Honor. We call Dr. William Miller to the stand.

MR. WALL: Your Honor, my co-counsel Ms. Selena Kyle will be objecting on this witness.

THE COURT: All right.

WILLIAM J. MILLER,

called as a witness on behalf of the Defendants, having been first duly sworn, testified as follows:

THE CLERK: Please state your full name for the record and spell your last name.

THE WITNESS: William J. Miller, M-I-L-L-E-R.

THE COURT: You may proceed.

DIRECT EXAMINATION

BY MR. O'HANLON:

Q. Dr. Miller, what is your occupation?

A. I'm a consulting engineer.
Q. And do you have an area of specialty?
A. My specialty is testing California water problems with an emphasis on the Delta.
Q. Has the San Luis and Delta-Mendota Water Authority retained you as a consultant?
A. They have.
Q. And are you paid for your services?
A. I am.
Q. And when did the San Luis and Delta-Mendota Water Authority first become a client of yours?
A. 1993.
Q. Do you work for other clients as well?
A. I have.
Q. Can you describe for the Court, please, your educational background?
A. I have a bachelors degree in civil engineering. I have a masters degree in environmental engineering and a Ph.D. in environmental engineering from UC Berkeley.
Q. And could you describe for us what is the field of environmental engineering?
A. It's a -- it varies depending on how you specialize, but in my case I specialized in the water aspects of environmental engineering. So my thesis was on biological waste treatment. I minored in my Ph.D. program in probability statistics and

chemistry and chemical engineering. The program is intended to give you a broad background to deal with various environmental problems. In my case, those focusing on water.

Q. And you mentioned the statistics was part of your education. Why -- why did the program include study of statistics?

A. Well, because most of the analyses that you do involving data eventually come to a point where you're trying to figure out whether you've got something or not. And statistics is the formalized mathematical way of doing that.

Q. What year did you obtain your Ph.D.?

A. 1970.

Q. And can you describe for us your work experience since 1970?

A. After I got out of the Army, I went to work for Bechtel and at Bechtel, I was involved in large regional studies involving how to supply water or how to dispose of wastewater for large regional areas, including the central valley of California, including the Delta. You want me to --

Q. Did that work include developing basin plans for the Regional Water Quality Control Board?

A. It did. That was my first real exposure to the -- where I was beginning to get some intimate association with the California water system and the Delta and the relation between the two.

Q. And at some point did you leave Bechtel?
A. I did. I went to work for an organization called the Association of Bay Area Governments. They have a large federal grant to do a water supply, water quality, solid waste, air quality plan for the San Francisco Bay area. I was the technical manager for that study.
Q. And what did your work as technical director include?
A. It involved -- my main emphasis, again, was on the water aspects of it. So I was more heavily involved in that. But another role I had there was trying to figure out what the linkages were between how you manage water, how you manage wastewater, how you manage air quality and which of those linkages were important and which were not.
Q. And that was with regard to San Francisco Bay?
A. Yes.
Q. All right. Have you served as a member of the State Water Resources Control Board?
A. Yes. I served as a member of the board for two and a half years in the late 1970s.
Q. And while you were a member of the State Water Resources Control Board, what was the focus of your work?
A. There were two focuses. Board members can have projects or programs that they're largely responsible for. In my case, when I had done the plan, worked on the plan for San Francisco Bay, one of the recommendations we made was that there should

be a program to monitor waters of San Francisco Bay and do research on it.

And when I became a member of the board, I realized I had the power and authority to cause such a program to be created. So that was one of the things I worked on. This program was eventually created in 1986. It was known as The Aquatic Habitat Institute. And because I remember the meeting where Don Mongan, who's the chairman of the board, and I talked about what it should be called and we decided that was a good name. In retrospect, I don't think it was. It was subsequently changed to the San Francisco Estuary Institute.

And then the other major program I worked on, when I first got on the board, we had rejected the plan for erosion and sediment control for Lake Tahoe and I actually voted against the rejection because I thought it was irresponsible of the board to be rejecting a plan without providing some substitute. So I became a board member who was in charge of the board's effort to develop such a plan, which we ultimately did.

Q. Have you taught a course Water Management in California?

A. I did. When I was on the board, I first taught that course at UC Davis. And when I left the board, I continued to teach that course for the UC engineering extension at least once a year and then typically several other times upon request.

Q. And what was included in the scope of that course?
A. Basically I covered the physical system in California, where the water comes from, where it goes, how it's moved from one place to another. I covered the institutions.

It's a public agency game, water management is, and so I talked about those institutions of power and authority. I also talked about the rules that govern water management. The laws and regulations, the water rights rules, the contracts among the various parties for the distribution of water.

And then I would talk about the problems that the system was facing and that, for the entire time I taught the course, usually brought me back -- always brought me back to the Delta because it was such a contentious area and so important to the state's water system.
Q. And to develop the material for that course, did you contact interested parties and regulators, et cetera, to learn about the Bay-Delta and its issues?
A. Yes, I did. I talked to people who were experts in various aspects of water management. I read a lot. I got -- collected data and analyzed it. And I was involved in water management in California increasingly, so I had personal experience to draw on.
Q. Beginning in 1980, did you work as an independent consultant?

A. Yes. When I left the board, I became an independent consultant. I've been doing that ever since.
Q. And what are some of the projects you've worked on as an independent consultant?
A. Early on, I did a report, kind of an overview of conditions in San Francisco Bay. The water quality, the relationship between water quality and fish, between conditions in San Francisco Bay and fresh water outflows coming into the bay.

I did a similar report on the Delta a few years later, describing how water moves in the Delta, how the relationship between the tides and riverine flows, fish abundance, how water projects affected these various factors. And you might refresh my memory if there are others, but --
Q. Who did you prepare that report for --
A. The last one was for an association called the California Urban Water Agencies, which is the large water -- urban water agencies of the state.
Q. And the report that you did on San Francisco Bay, who were your clients on that work?
A. That was a Joint Powers Authority of Wastewater Dischargers in San Francisco Bay.
Q. Have you served as a witness in State Water Resources Control Board proceedings?
A. I have. Yes. In hearings involving water rights, permits

and water quality -- water rights permits for the two state and federal water projects and the water quality control plan accompanies that.

Q. Was that in 1988?

A. Yes. And a few years later, yes.

Q. And what was the scope of the work that you did in connection with those hearings?

A. Initially, it involved the relationship between water projects and conditions in San Francisco Bay. And then later on, I became involved in more of the Delta issues.

Q. Have the projects you worked on as a consultant involved assessing the impact of water project operations on fish?

A. Yes.

Q. Can you describe that work for us beginning with the earliest work?

A. Many years ago, the most politically powerful fish in the Delta was the striped bass. It was a popular recreational fish and there was widespread concern that the water projects, the exports and the outflow from the Delta as affected by water projects were having a significant affect on the abundance of striped bass.

And several of us went to work on that problem. There was a mathematical model that was supposed to describe that relationship. We analyzed that model. Our conclusion was that the model was not a valid model and that it did not

look like the water projects were having the effects on striped bass, at least that were thought.

Q. Was that view later confirmed by another researcher?

A. Dr. Bill Bennett, whose name has been mentioned numerous times here, subsequently did a study that identified ocean conditions as a major factor in striped bass abundance.

Q. What was the next species that became a focus of your work in respect to fish and project operations?

A. I worked on salmon. In particular, at that time, again there was a common opinion that water project operations in the Delta were having a major effect on salmon populations. I obtained the data -- the fish agencies conduct studies of -- where they release large numbers of coded-wire tagged fish and track their movements.

And from those studies and statistical analyses you can do with those studies, it's possible to assess, to answer such questions as what percent of the population is being entrained at the pumps, you know, what percent of the population is leaving the Delta, for example. And those data indicated to me that the fraction of the out-migrant population that was undergoing mortality at the export pumps was actually very small, on the order of a percent or so.

And at the time I was also working with people who were familiar with the Pacific Fisheries Management Council and data. And I obtained that and that indicated that the

legal harvest of salmon was up around 80 percent, so that four out of every five adult salmon were being legally killed in the ocean. And for winter run salmon, it was about half of the adult population. And at that time, the winter run population had fallen to 200 returning salmon. And the water projects were thought to be a major cause of that decline.

But subsequently, I can't say this -- that this happened because of what I did, I think people at the National Marine Fisheries Service were doing the same sorts of analysis. And they subsequently reduced the harvest of winter run salmon and took some other measures involving -- actually involving water projects upstream effects and winter run salmon has rebounded substantially.

Q. Have you also done work with respect to evaluating impacts of project operations on the delta smelt?

A. I have. For the past six or seven years, that's been the focus of my work.

Q. And are you familiar with methods of analyzing data related to project operations and the delta smelt to explore the relationships between the factors affecting fish in the Delta?

A. I am.

Q. Have the methods you've used included statistical analysis?

A. They have.

Q. What kinds of statistical analysis have you applied?
A. Most of the time we are looking for simple relationships, obvious relationships in the variables. The most common analysis we're using is some form of regression analysis to see what the relationship -- to test the relationship between one variable and one or more other variables.
Q. Can you describe a bit more for us what a regression analysis is?
A. We've seen some of them here already. The simplest case, you have two variables. Let's say fall midwater trawl abundance of delta smelt on the one hand and another variable, let's say, exports from December through March on the other. And you want to know does there appear to be a strong relationship between those two variables.

In other words, is there a tight fit on the line and what is the probability -- if I think I see some of it, what is the probability that, in fact, there is no fit, but that the points have just by accident arranged themselves to deceive me into thinking there's a fit.

And one other thing, if there is a fit, then one of the things you would be interested in is what sort of change does that indicate might occur in the fall midwater trawl index for any given change in December, March exports. In other words, if there is relationship, how sensitive is the fall midwater trawl to December-March exports?

Q. Is regression analysis a standardly applied statistical technique?
A. Yes.
Q. Have others applied regression analysis to determine factors that may be affecting delta smelt abundance?
A. Yes. It's a common method.
Q. Do you -- can you offer names of a few people who have done that?
A. Who -- well, Dr. Swanson. Dr. Hanson. Dr. Kimmerer. Dr. Bennett. It's a very common. It's the last step generally in the analysis.
Q. And this work that you do, this analysis, do you do it on your own?
A. No. I work with a team. I have an associate, Dr. Tom Mongan, who's a civil engineer Ph.D. in physics, whose background is the evaluation of complicated environmental problems. And we work with -- he and I work with a data analyst, data management expert, and then we have other consultants that join us from time to time. We've worked with Dr. Hanson before. And in recent years, we've had a pretty strong relationship with Dr. Bryan Manly, who's one of the world's foremost ecological statisticians.
Q. And as a result of your work and experience, are you familiar with the available data sets regarding abundance of delta smelt?

A. Yes.
Q. Can you briefly identify what those data are?
A. Well, there are a number of data sets. The four of most interest, if you're concerned about delta smelt and their abundance, are the four surveys that are taken each year. There's the Kodiak trawl in the Spring, Kodiak trawl that samples in generally January through May each month for adult salmon. Gives you an estimate of where they are, what their reproductive stage is. It's possible from those data to develop abundance indices for adults. That's followed --

THE COURT: You said "salmon," doctor, you --

THE WITNESS: I'm sorry, I meant delta smelt. Thank you.

THE COURT: Yes.

THE WITNESS: You'd think after seven years, you could make the switch.

Then there's the 20 millimeter survey that occurs every two weeks in the spring for two plus months that samples all the Delta. It collects data on the number and size and length of delta smelt and also a number of other concurrent -- much other concurrent sampling is done on the water quality and, most importantly, on zooplankton densities at the same stations where delta smelt are sampled.

And that's followed in the summer, June, July, August, by the Summer Townet Survey that samples for juvenile

delta smelt and that's followed in the fall by the fall midwater trawl that produced the fall midwater trawl index, which is the main index of delta smelt abundance. Those first three surveys generally sample at 40 to 50 -- between 40 and 50 stations. Fall midwater trawl is about 100 stations.

BY MR. O'HANLON:

Q. As a result of your work and experience, are you familiar with the available data regarding hydrodynamics and water quality within the Delta?

A. I am. I, in the mid '90s, did a report on transport mechanisms in San Francisco Bay. I'm not a mathematical modeler, that's generally what's required to analyze movement in this -- in the complex estuary, but I have worked with those models and am familiar with what they can do.

Q. Do you keep current regarding the latest research involving the delta smelt?

A. I do. I read a lot. I attend almost all the meetings where technical matters involving delta smelt are discussed. I participate in those meetings and make presentations at those meetings on the work we've been doing.

Q. Which meetings do you attend?

A. The best meeting, in my opinion, is the roughly two or three month meeting of what's called the Estuary Ecology Team. It's about 20 to 40 scientists who are involved in work on San Fran -- on the Delta. And at those meetings -- they're

informal meetings, but the latest research is presented and critiqued at those meetings.

Q. And you exchange ideas and research within that community?

A. Yes. I mean, it's not unusual to have an email flurry start up by virtue of something at one of those meetings or something else. There would be exchanges back and forth, including transmission of data and analyses.

Q. Are you a biologist?

A. I'm not.

Q. Is the relationship between fish in the Delta and project operations solely a question of biology?

A. I don't think it is. Obviously there are biological aspects to it, but there are other important aspects. One of the most important is Delta hydrodynamics. How do things that are in the waters of the Delta move? Are they neutrally bouyant, do they move like water molecules or not? And if not, how do they move? There's a formidable data management problem if you're dealing with this question about delta smelt. The data sets are very large. Some of them are riddled with errors. And you have to have expertise in how to deal with those or you simply get bogged down in the data.

And then, of course, the statistical analyses at the end of the process are critical. The fact is no one is an expert at -- it's a multi-faceted problem. No one is an expert at all aspects of it.

Q. Do you approach a complex problem, such as the delta smelt status, the same way that a biologist would?

A. Based on my experience, no. I would -- we tend to have a different approach. A good example is the current Pelagic Organism Decline program, which -- in which the approach is to identify all the factors that could be affecting delta smelt and the other fish of interest and to study those factors and try to determine which ones are important and which ones are not, how they relate to each other and so forth.

It's a -- it's -- I don't particularly have a problem with it, I mean, I can't say that's not a good process. But it has the advantage that you don't miss anything, but it has disadvantage of creating a lot of information that's very difficult to sort through and sift through and synthesize some simple story if, in fact, some simple story exists. And it's time consuming.

Q. Are you a member of the team appointed by the Fish & Wildlife Service to prepare a new recovery plan for the delta smelt?

A. I am.

Q. Who are some of the other members?

A. Dr. Hanson is a member. Dr. Moyle is a member. Dr. Bennett is a member. Dr. Kimmerer is a member. Dr. Chotkowski is a member. There are a number of others.

Q. Were you asked by the San Luis and Delta-Mendota Water

Authority to provide your opinions regarding certain issues to be addressed at this hearing?

A. I was.

Q. What issue were you asked to address?

A. The relationship between delta smelt abundance and water project operations, particularly exports, and the relationship between delta smelt abundance and other factors.

MR. O'HANLON: Your Honor, I ask that Dr. Miller be qualified as an expert to provide an opinion regarding the relationship between the delta smelt abundance and project operations as well as other factors based on his analysis of the available data.

THE COURT: Any objection?

MS. KYLE: No objection, Your Honor, with the understanding that Dr. Miller's not a biologist and also is not an agency water project operator.

THE COURT: All right. That is my understanding. The Court accepts the tender of Dr. Miller as qualified by education, background, training and experience to offer opinion testimony on the subject of the relationship between the abundance of delta smelt and the projects referred to as the State Water Project and Central Valley Project operations and other factors. You may proceed.

MR. O'HANLON: Thank you, Your Honor. The time is five minutes to and I was wondering if the Court would want to

take a break at this point. I'm about to go into the substance of his testimony.

THE COURT: Let's go. We're going 20 more minutes.

MR. O'HANLON: All right. Thank you, Your Honor.

Q. Dr. Miller, have you prepared a PowerPoint presentation?

A. I have.

Q. And would the slides from that presentation be helpful in presenting your testimony to the Court?

A. Yes.

MR. O'HANLON: Your Honor, I would like to have marked as San Luis Exhibit C a set of the slides. I have a complete set for everyone. And each slide is numbered.

THE COURT: Yes.

(Defendant's Exhibit SL C was marked for identification.)

MR. O'HANLON: May I approach the witness, Your Honor?

THE COURT: You may.

MR. O'HANLON: Your Honor, I've also arranged to have the PowerPoint presentation displayed on the screens in the courtroom.

THE COURT: Yes, you may.

MR. O'HANLON: Thank you.

Q. Dr. Miller, I'd ask you to turn to slide number two. Does slide number two state your opinions for the Court in this

matter?
A. Yes.
Q. Would you please read those for us.
A. There are three of them. The first one, no analyses indicate a relationship that is both important and statistically significant, between project exports or -- project exports or entrainment and delta smelt spawning abundance, despite extensive searches by many analysts.

Number two, there are important and statistically significant relationships between, one, spring or summer co-occurrence of delta smelt and their prey; and, two, subsequent spawning abundance. So food density is very important to subsequent delta smelt abundance.

And three, interim remedies proposed by plaintiffs and others are not likely to make a meaningful difference to the number of delta smelt that will survive to spawn in 2009.
Q. Dr. Miller, I'd like you to turn to slide number three, which is a restatement of your first opinion. I'd like to ask you, in your opinion, you refer to delta smelt spawning abundance. Why have you focused on that as important to understanding the effect of project operations?
A. My experience, when you -- if you are looking at earlier lifestages, often what will happen is that you're not seeing the effects of some important factor that occurs, that acts after that lifestage. So, for example, if you -- if you are

basing your decisions or focusing your efforts on the Summer Townet Survey of juvenile abundance, you can miss the fact, that I will justify to later, that there's a significant bottleneck that occurs in the summer between the juveniles and the subsequent fall caused by the lack of food.

So you might mislead yourself if you don't deal with the data on the last lifestage, so to speak, namely the adult spawning abundance.

Q. So which survey, in your opinion, is the most useful for assessing impacts upon delta smelt spawning abundance?

A. The most useful would be the Spring Kodiak Trawl. It samples the fish in nets. It's fishing for adult delta smelt, which are relatively easier to catch. And it is sampling for the adult spawning population.

However, that survey only started in 2002. And typically we would like to look back farther than that for relationships to find out what seems to be affecting smelt abundance and what is not.

So the cause of that, in my opinion, and I think it's generally accepted, that the fall midwater trawl is the best measure of abundance, of adult delta smelt spawning abundance.

I have prepared estimates of adult spawning abundance based on the Kodiak trawl and I've compared those with the fall midwater trawl. And over the years, when the Kodiak trawl has been carried out, there's an excellent relationship

between the two. So I have some confidence that the fall midwater trawl is giving us a pretty good estimate of the abundance of adult spawning delta smelt.

Q. And what is the basis of your opinion number one?

A. There are four bases. The first is a series of reports setting forth the results of statistical analyses by Dr. Bryan Manly. The second is a -- a series of analyses that we did, with Manly's assistance, restricted to years when smelt were close to the pumps, delta smelt were close to the pumps. The third basis is our analysis of the plaintiffs' analyses. And the fourth basis, can you refresh my memory?

Q. Did you do an analysis of entrainment effects?

A. Yes. Analyses we did were focused on entrainment effects because there's so much concern about entrainment.

Q. I'd like you to turn to slide number four. And discussion of the first bases for your opinion. Dr. Manly's analysis.

Can you describe for us briefly, first, who is Dr. Bryan Manly?

A. Dr. Manly -- Dr. Bryan Manly is an ecological statistician. He has an excellent reputation. He's written seven books on the subject. He has clients all over the world. Is there more you would like?

Q. What analysis did Dr. Manly do?

A. He did three -- they -- there are four general -- four reports that he did setting forth his analyses. He did three

for the Pelagic Organism Decline program, under their direction. He's actually working with Dr. Chotkowski on those. He first analyzed -- for step changes in the abundance of delta smelt and other of the pelagic organisms that have declined.

Then he did two analyses on trends in delta smelt abundance, on the abundance of these pelagic fish and the factors that are -- might be affecting those trends.

And then he did a long report, I think it was 105 pages, re-analyzing data presented by a host of presenters at a meeting of the Environmental Water Account Science Panel in late 2005 where he was essentially checking to see whether the analyses that were presented, some of which conflicted with each other, were done the right way or not.

Q. Dr. Miller, did Dr. Manly prepare a declaration for this proceeding?

A. He did.

Q. And does that declaration attach and describe his analyses?

A. Yes, it does.

MR. O'HANLON: Your Honor, I would like to have marked as San Luis Exhibit D Dr. Manly's declaration, which was dated June 21st, 2007. Document No. 373.

(Defendant's Exhibit SL D was marked for identification.)

MR. O'HANLON: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. O'HANLON:

Q. Dr. Miller, do you have what is now San Luis Exhibit D before you?

A. Yes, I do.

Q. All right. And are the first four exhibits to that declaration reports describing the analyses by Dr. Manly that you referred to?

A. Yes, they are.

Q. Please turn to slide five. Does slide five describe Dr. Manly's conclusions based on his analyses?

A. Yes.

Q. And what were those conclusions?

A. Dr. Manly found statistically significant but unimportant effects of exports on subsequent fall midwater trawl abundance of delta smelt.

Q. Do you know what factors he considered in analyzing the effects of exports or project operations on the delta smelt?

A. In the work for the Pelagic Organism Decline, he considered a number of flow and export factors and water quality factors.

And then in the process of this re-analysis of the presentations in the December 2005 Environmental Water Account

Workshop, he also looked at salvage. He did some salvage analyses there as well as additional export analyses.

Q. Can you please refer to paragraph 14 of Dr. Manly's declaration.

A. Yes. I have it.

Q. And does Dr. Manly there summarize his conclusions based on his analyses?

A. Yes.

Q. Would you please read that for us.

A. "I can sum up my conclusions from the analyses that I've done over the past few years by saying that so far it appears that river flows and exports cannot account for most of the downward trend in delta smelt numbers in recent years. Some other change to the system seems to have happened in about 1999 to cause a decline. What is therefore needed now is further work to better understand the system and to identify any important variables that are not currently being considered to account for the decline."

Q. And did you rely on --

MS. KYLE: Your Honor, I'm sorry, we're going to object to this line to the extent it's being offered for the truth of the matter. Dr. Manly is not here to be cross-examined.

THE COURT: All right. I'm going to sustain the

objection in part. I will permit Dr. Manly's declaration to be used for the purpose of showing what effect it had on the opinions of Dr. Miller. An expert can rely on the hearsay testimony and opinions, but it doesn't make the underlying opinions that are relied on admissible in evidence. Therefore, to that extent the objection is sustained.

BY MR. O'HANLON:

Q. Dr. Miller, did you rely on Dr. Manly's opinion?

A. I did. I had many exchanges with Dr. Manly, mostly by email, on -- you know, to understand exactly how he did his analyses and the major conclusions that he reached.

Q. Did you rely on Dr. Manly's opinion as expressed in paragraph 14 of his declaration?

A. I did.

MR. O'HANLON: Your Honor, I --

THE WITNESS: At least in part.

MR. O'HANLON: Your Honor, I would move San Luis Exhibit D into evidence.

THE COURT: Any objection?

MS. KYLE: Your Honor, he said he relied on it in part, I just wasn't sure what he meant by that.

THE WITNESS: I mean in addition to other things.

THE COURT: Did you read the whole declaration?

THE WITNESS: Unfortunately, yes.

MS. KYLE: Your Honor, we'd just like to --

THE COURT: I'm not going to comment on that. Since I'm expected to read it too.

THE WITNESS: I don't recommend it, sir.

THE COURT: Well, if your client tells me, I'll accept your recommendation.

All right. I'm going to -- I think that establishes he's relied on it. I'm going to make the same ruling. I'm going to admit the declaration into evidence with the objection sustained to the underlying opinions. It is evidence of a material that Dr. Miller has relied on in informing his opinions in the case.

MS. KYLE: Your Honor, no further objection to the body of the declaration on that basis, but the exhibits we still object to. It hasn't been shown that he's relied on those.

THE COURT: Well, for now that objection is sustained. The exhibits lack foundation.

BY MR. O'HANLON:

Q. Dr. Miller, did you read the exhibits attached to Dr. Manly's declaration?

A. Yes.

Q. Did you rely on those reports in forming your opinion?

A. Yes.

MR. O'HANLON: Your Honor, I move the exhibits attached to the declaration into evidence.

THE COURT: Objection?

MS. KYLE: No, Your Honor.

THE COURT: All right. The exhibits are received subject to the same limitation as I've placed on Dr. Manly's opinion.

(Defendants' Exhibit SL D was received.)

THE COURT: You may proceed.

MR. O'HANLON: Thank you, Your Honor.

Q. Dr. Miller, did you have discussions with Dr. Manly about his analysis?

A. Many discussions.

Q. In the course of those discussions, did you discuss with Dr. Manly the relative magnitude of the effects of exports and flow as compared to other factors affecting the delta smelt?

A. Yes.

Q. And Dr. Miller, what did Dr. Manly tell you was his conclusion about the relative effect of exports and flows on abundance of the delta smelt?

A. He referred to them once as wiggles the trend line. And his quantification of those effects indicated that they were on the order of a few percentage per year. That is, they were affecting the abundance of delta smelt by a few percent a year.

MR. O'HANLON: Your Honor, I'd like to have marked as San Luis Exhibit E another declaration by Dr. Manly. This is

the declaration dated -- or filed July 23rd, 2007. It's document No. 408.

(Defendant's Exhibit SL E was marked for identification.)

MR. O'HANLON: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. O'HANLON:

Q. Dr. Miller, do you have before you San Luis Exhibit E, another declaration by Dr. Manly?

A. Yes.

Q. And did you consider the opinions expressed in this declaration in connection with forming your own opinions?

A. Yes. They're opinions I had heard before from Dr. Manly.

Q. And did you rely on these opinions?

A. I did.

Q. I'd like to refer you to paragraph eight of that declaration. And I'd ask you to please read it aloud.

A. "I do not know what the cause of the delta smelt decline is. My analyses have suggested that although pumping may cause some reduction in numbers, the effect is nowhere near enough to account for the recent dramatic decline in delta smelt numbers. Assessing the level of the effect depends on the particular model used, but as an example, in one analysis

sampling area effects and general time trends accounted for about 62 percent of the variation in fall midwater trawl delta smelt numbers for 1967 to 2004, while general effects of hydrology" -- that is "(river flow minus exports) accounted for just two percent more of the variation in the delta smelt numbers. Based on these types of results it appears that some other factor is involved in the recent severe decline in fish numbers (increased predation, reduced food, et cetera)."

Q. And is the statement in this declaration consistent with what Dr. Manly told you in your conversations about the relative effect of exports compared to other factors?

A. Yes, it is.

MR. O'HANLON: Your Honor, I would move San Luis Exhibit E into evidence.

THE COURT: Any objection?

MS. KYLE: Your Honor, same objection as before.

THE COURT: All right. I'm going to make the same ruling. I will admit the declaration as explanative of material relied on by Dr. Miller in forming his opinions. It will not be accepted for the truth of the matter as asserted by way of opinion.

(Defendant's Exhibit SL E was received.)

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BY MR. O'HANLON:

Q. Dr. Miller, another basis for your opinion was what you refer to as a close to the pumps analysis; correct?

A. Correct.

Q. Would you please turn to slide number six and explain for the Court how you came to do this analysis.

A. We were expecting to find effects of exports. And when Dr. Manly and ourselves and a number of other analysts were failing to find those effects, I became concerned that maybe we were missing something.

And in particular, what I was concerned about is the fact that in all years delta smelt migrate back up into -- the adults migrate back up into the Delta, basically the Sacramento River side of the Delta which is the other side of the Delta from the pumps. In those years, you would not expect that if exports were having an effect, it would be -- that they would have much of an effect, if any effect, because the smelt were not close to the pumps. But in some years they migrate -- they also migrate up more in the southern part of the Delta, so that there are delta smelt closer to the pumps.

So if that were the case, it was possible that the effects of exports only occurred in the years when smelt were close to the pumps and not in the years when they weren't.

But if you were analyzing all the data together,

those -- the data from the years when they were not close to the pumps might mask the effect or hide the effect that was evident in the years when they were close to the pumps.

Q. So how did you go about evaluating whether that was the case?

A. We developed measures of close to the pumps for adults. We started with adult salvage and we reasoned that adult salvage is a pretty good measure of whether or not they're close to the pumps. But then, of course, adult salvage can -- you would expect it to be higher the higher the exports were for a given abundance of delta smelt. So we divided adult salvage by the December-March exports.

Then the further thought you would think, well, actually that's sort of a density of -- measure of the density of smelt in the exported water. You might think that would depend on how many smelt were out there. So we further normalized this by dividing by the previous fall midwater trawl. So we have a measure that was essentially the relative adult salvage density.

And we reasoned that when those numbers were high, that was a -- an indication that smelt were close to the pumps. And when they were not high, that was an indication that they were not close to the pumps. The juvenile --

THE COURT: At this time -- I'm sorry.

THE WITNESS: Sure.

THE COURT: I didn't mean to interrupt your answer.

THE WITNESS: It's perfectly all right.

THE COURT: You may complete your answer.

THE WITNESS: Well, I was going to explain what we did for juveniles.

THE COURT: Why don't we do this because that's a different subject.

THE WITNESS: Yes.

THE COURT: Let's take the noon recess at this time. We'll stand in recess until 1:15.

(Lunch Recess.)

THE COURT: Good afternoon, ladies and gentlemen. We're going back on the record in NRDC versus Kempthorne. We are taking the testimony of Dr. Miller. Mr. O'Hanlon, you may proceed.

MR. O'HANLON: Thank you, Your Honor.

Q. Dr. Miller, at the break we were discussing slide number six and specifically the measures that you developed to assess years when the delta smelt population was thought to be close to the pumps. And you described for us a measure of closeness to the pumps that you developed for adults. And I believe you were about to describe the measure that you developed for juveniles. Could you do that now for us, please?

A. Yes. For juveniles, we had analyzed data from the summer, the 20 millimeter surveys that occur in the spring and noticed

a relationship between the percent of the juveniles that were closer to the pumps and the March/April outflow. When the March/April outflow was low, the percentage of juveniles closer to the pumps is higher and vice versa.

Q. Okay. Now, having developed these measures, what did you then do with the data?

A. Well, if you could picture a large table of data with each row being a year and ordered with the first year at the top and the latest year at the bottom, we then changed the order in the table based, first on the measure of adults being close to the pumps, and then separately for the measure of juveniles being close to the pumps.

So now we had a table of data and the years at the top of the table were the years when these measures indicated that smelt were close to the pumps and the years at the bottom were years when the measure indicated that the delta smelt were not close to the pumps.

Q. All right. So you ranked them, then, instead of in chronological order, the years were ranked by measure of closeness to the pumps; correct?

A. Exactly.

Q. Okay. Then having ordered the years of data that way, how did you then search those years for effects from the export pumps?

A. We searched at the top of the list. So, for example, you

would start with the first four, let's say, three's not enough years really to get any kind of relationship. Start with the first four and, using only the first -- the years -- the four years when smelt, adult smelt were closest to the pumps, for example, we then looked for relationships -- I believe we searched for 26 different relationships between, on the one hand, exports or salvage of various measures of salvage and, on the other hand, the fall midwater trawl, subsequent fall midwater trawl abundance index. And then we would take the top five on the list and do the same, search for 26 relationships. And then the top six. And so forth.

Q. Okay. And what did you find as a result of that analysis?

A. That was shown on slide seven. We did this analysis, we sent the analysis to Dr. Manly for his review. He did additional analyses and the result of all of that was we found no statistically significant effects of either salvage or any measure of salvage or relative salvage or salvage density and/or exports and the subsequent fall midwater trawl or the change in the fall midwater trawl or the change -- the percent change in the fall midwater trawl.

And so basically we -- we sort of allayed the concern I had, at least, that the reason we weren't finding effects is because we -- we -- because they only occurred in years when the delta smelt were close to the pumps.

Q. And did you present the results of your analyses at the

various conferences and meetings that you attended?
A. Yes. Several times. They're posted online. We haven't received any criticism.
Q. Where were they posted online?
A. They're on a website that included a number of papers presented at the Environmental Water Account workshop of 2005.
Q. All right. I'd like to ask you, Dr. Manly, next about --
A. Dr. Miller.
Q. Dr. Miller. Excuse me. About the --
A. You wish.
Q. About the third bases for your opinion.
A. Yes.
Q. And that is your analyses related to entrainment at the export pumps. Can you explain how you went about assessing the impacts of entrainment?
A. There are three lifestages that are entrained at the pumps. There are adults --
Q. Excuse me. Is this summarized in slide nine?
A. Yes, it is. There are adults that are entrained when they migrate upstream to spawn. Some of the adults will be entrained. And that's measured as salvage. Then the adults spawn. They produce eggs, the eggs are attached to the -- to substrate, submerged substrate like rocks and the like. And in about two weeks they hatch into larvae and the larvae are not measured as salvage because they essentially are not

diverted by the louvers into the salvage tanks. And no smelt are counted at the salvage tanks until they reach at least 20 millimeters in length.

And then the juveniles subsequently are salvaged generally after March. And they are measured as salvage once they attain a length of 20 millimeters.

Q. Would you turn to slide ten. So you have salvage data for the adults and the juveniles, but not for larvae; correct?

A. That's correct.

Q. So how did you go about using the salvage data for adults and juveniles to assess entrainment effects?

A. We assumed that salvage was a measure of adult and juvenile smelt entrained. Entrainment is actually larger than salvage, but salvage is the -- we took salvage as the measure of entrainment. And we took the previous fall midwater trawl as a measure of spawning abundance of smelt for reasons that I talked about earlier.

And therefore, if salvage is a measure of the adults or juveniles entrained and the previous fall midwater trawl is a measure of spawning smelt, then if you divide one by the other, you have some index of the fraction of smelt killed at the export pumps. And if entrainment is important, then this fraction should affect each year's change in abundance. That is, the change in the fall midwater trawl.

Q. I'd like to show you slide 11. And what does this depict?

A. This is what you would expect to see if salvage were important. On the X axis is the -- would be the data for the salvage, either adults or juveniles, divided by the previous fall midwater trawl as a measure of the fraction of the population entrained.

And if the fraction of the population entrained were large, you would expect to see some relationship between the fraction of the population entrained and the percentage change in the fall midwater trawl over the year when that salvage occurred. So you would expect to see a graph that looked like that.

Q. So the higher the proportion of the population entrained, then the more negative the change in the fall midwater trawl index; correct?

A. That's correct.

Q. And what did the data actually show?

A. It actually showed what's on slide 12, which is markedly different and shows no relationship whatsoever.

Q. Would you first explain the graph in the upper left-hand corner of the page of slide 12.

A. The upper left-hand corner is for adults. It shows the relative adult salvage, that is salvage divided by the previous fall midwater trawl, which as I said, is an index of the fraction of adults entrained. And on the Y axis is the annual percent change in abundance of delta smelt as measured

by the fall midwater trawl. So what we should be seeing here is the same thing we saw on that previous graph, which I made up.

Q. What period of years did you use for this graph?

A. This is the period '93 through 2005. Because the -- we had an extensive email and other exchanges about the dates over which -- during which the identification of delta smelt at the export pumps was reliable and the conclusion was that -- generally that everybody thought that the -- that the identification was reliable beginning in '93 and there was some question about whether it was reliable before that.

Q. And can you explain the graph in the lower right-hand portion of slide 12 --

A. Essentially the same graph for juvenile salvage. And juvenile salvage in absolute numbers is usually much larger than adult salvage because there are a lot more juveniles. So it's the same graph. Again, it shows -- does not show the expected relationship. It doesn't show any relationship at all. The percent change in the fall midwater trawl index appears to be, from these graphs, independent of the fraction of the population that is entrained as measured by salvage over the previous fall midwater trawl.

Q. All right. Now, for adults and juveniles, you have the salvage data. How did you assess larval entrainment?

A. Larval entrainment, our method there is summarized on

slide 13. As I said before, salvage smelt are not counted if they're less than 20 millimeters. So most of the larval entrainment is not even measured.

Winter exports would be a proxy for larval entrainment. Assuming that larvae are neutrally bouyant particles. Actually there's evidence that they are not. But to the extent they were, you might expect to see some relationship between winter exports as a proxy for larval entrainment. But winter exports have no relationship with the fall midwater trawl.

Q. Now, Dr. Swanson found a relationship between winter exports and fall midwater trawl; correct?

A. Yes.

Q. We'll be addressing that a little bit later in your testimony.

A. All right.

Q. What else did you consider in connection with assessing larval entrainment?

A. There -- we also assessed whether larvae could be entrained based on where they were in the Delta. And you can do that by -- an easy way to do that is by looking at the distribution of spawning females from the Spring Kodiak Trawl.

Q. All right. And have you prepared a slide depicting the distribution of spawning females in 2005?

A. Yes. This is just one year example. But you can see

four -- these are just copied from the Department of Fish & Game website where these results are displayed.

Q. We're talking about slide 14; correct?

A. Yes. Slide 14. And it has the results of the surveys for January, February, March and then the lower left is April.

Q. Can you explain for the Court what these diagrams depict?

A. These are the -- what's known as the bubble diagrams. And they show the relative density of adult smelt caught at each station. And they show their reproductive stage.

So in this case, we're looking for primarily the green slices, which indicate that they found spent females, which means they have -- they have spawned in their -- released their eggs and most of them, at least, are going to die.

And you can see from this that in January there weren't any of those spent females.

In February, we began to see some up on the Sacramento River and Cache Slough.

And then in the third diagram, at the top right, we see more of them up in the upper northern part of the Delta on the Sacramento Riverside and then down below the confluence.

And then the similar pattern in April, where we see the spent females up on the Sacramento River.

Q. All right. And what does the location of the spawning in 2005 suggest to you about the likelihood of larval

entrainment?
A. In this year, this is the pre-VAMP period. And based on my experience in the Delta and studies of the way things move, it's highly unlikely that you could entrain the larvae that -- that were produced up here on the Sacramento River or especially down in Suisun Bay and Suisun Marsh.
Q. Dr. Miller, there's been testimony in this case that Dr. Bennett has done research suggesting that only the larvae hatched during the VAMP period survive.

Do you know if that's what Dr. Bennett has actually found in his research?
A. I'm not sure that's what he actually found. I don't know for sure.
Q. Okay. Has he spoken publicly about that research?
A. He has given several presentations, PowerPoint presentations at conferences or workshops.
Q. Have you asked him for a copy of his PowerPoint presentation?
A. I have.
Q. And has he provided it to you?
A. He has not.
Q. Did he say why he declined to provide it to you?
A. He said he declined to provide it to me and anyone else who asked for it because he was still working on the analyses and he had not completed that nor had he written it up yet.

Q. And has he made the underlying data available to you for review?
A. No.
Q. And in other circumstances with respect to other work, has Dr. Bennett shared analyses and data with you?
A. Yes.
Q. And you've provided him with data as well?
A. Yes.
Q. So you have that sort of a working relationship with Dr. Bennett?
A. Yes.
Q. Do you think it's appropriate to base management actions on Dr. Bennett's research at this point?
A. Well, my experience in that regard would go back to when I was a member of the Water Resources Control Board. And based on that, I would not want to base any significant decisions on that analysis until there was a chance to critically review it.
Q. Dr. Miller, I referred a moment ago to Dr. Swanson's analysis of the effect of winter exports on the subsequent fall midwater trawl index. That's described in Plaintiffs' Exhibit 4, which is Dr. Swanson's declaration of August 13th. And specifically in paragraph 42 of her declaration. That's at page 34 of 135. Can you find that, please?
A. Do I have that?

Q. Yes. You should have it up there with you at the podium.
A. I don't believe I do.
Q. All right. Let me provide you --
A. But I'm familiar enough with it to know what it says.
Q. Dr. Miller, have you -- do you now have in front of you Plaintiffs' Exhibit 4 --
A. I do.
Q. -- specifically at paragraph 42.
A. I do.
Q. Is there an analysis described in paragraph 42?
A. Yes, there is. Between the log of the base ten of the fall midwater trawl index and the previous December March average exports.
Q. And did you replicate that analysis in slide number 16?
A. I did.
Q. Can you please explain what is in slide 16?
A. Slide 16 shows on the Y axis, the logarithm of the fall midwater trawl. The reason that Dr. Swanson took the logarithm instead of just plotting the fall midwater trawl itself was because -- to ensure that the analysis was statistically valid. If there's increase in variation in the fall midwater trawl in one direction or another, to the left or to the right on this graph, then a common practice is to transform that variable by taking this logarithm and thereby satisfying the underlying assumptions that are necessary for

regression analysis.

And on the X axis is the average December-March exports in cubic feet per second. And the graph covers data from 1967 through 2006, with the exception of two years, '74 and '79, when there was no fall midwater trawl index -- when there was no fall midwater trawl taken.

Q. And did this analysis indicate a statistically significant relationship between exports in the winter and the subsequent fall midwater trawl index?

A. It does. It indicates that the R-squared is .27, which means that the December-March exports explain about 27 percent of the variation in the subsequent -- the log of the subsequent fall midwater trawl. And it also has a P value of .0009, which indicates that there's very little chance that this correlation occurred by chance.

Q. All right. The R-squared and P value that you report in slide 16 are slightly different from those reported in Dr. Swanson's declaration.

A. They are.

Q. Do you have an understanding of why?

A. I imagine it's because of some slight difference in the way we determined December-March exports. There are several different ways of doing it. You can average the monthly flows, you can average over the entire period. Sometimes analysts do it one way; sometimes they do it another. It

really doesn't make any difference. They're essentially the same --

Q. Is she reporting a --

A. -- correlation.

Q. -- is she reporting in her declaration an R-squared of .255. Is that significantly different from.27?

A. I don't think so.

Q. How did you go about analyzing the validity of this exercise?

A. First thing I did was to plot these data out year by year to show the time trend. And that's shown on slide 17. The green line is the fall midwater trawl index. And you read that on the left.

And then the blue line is the December-March exports and you read that on the right.

And at the bottom, you see the year starting in '67 and going through 2006 with the missing years of the fall midwater trawl index shown in here.

Q. All right. And what does this slide indicate to you about the data?

A. Right away I would be concerned about those high fall midwater trawl values 40 years ago, shown with the red arrows, and the low -- coinciding with the low exports, also shown in the red arrow. I would be concerned that maybe the correlation I got by doing the analysis over all the years was

driven by or produced by those relatively extreme values that occurred 40 years ago.

Q. And why would that be a concern?

A. Well, if I'm going to use this analysis, this correlation as a basis for actions next year, I want to know -- I want some confidence that that relationship is holding in recent years. And rather than having it be a relationship that only occurs -- only achieves statistical significance because of things that occurred four decades ago.

We know that in the last 40 years, there have been major changes in the Delta. Primarily related to the continual introduction of alien species. If you go out in the Delta now and cast a net in inertial waters, 95 percent of the fish that you catch will be aliens. The Delta is now one of the most popular places for large mouth bass larvae. Large mouth bass is an alien species. It's a predator.

There have been major changes, the most -- one that's already been talked about here is the invasion of the Asian clam that was introduced in 1986 and, according to USGS, changed the food web in the western Delta Suisun Bay from pelagic or floating to benthic or bottom dwelling by essentially pulling the biological energy out of the water column into the bottom where they feed by filtering water through their systems.

And we have invasive plants that we find called the

egeria densa, probably introduced to the Delta when somebody dumped their home aquarium down the sewer. This plant is growing along with water hyacinth all over the Delta. The egeria densa changes the quality of the water that it grows in. It clears up the water, which is bad for delta smelt. And it provides cover for predators which can prey on delta smelt. Ambush predators.

So there are many, many major changes that have occurred in the last 40 years. And any relationship that did not account for those, especially one that appeared to be driven by data from four decades ago, would cause me to be really suspicious about using it as a basis for actions for next year.

Q. And did you do an analysis using a shorter period?

A. I did. We did all possible analyses for a shorter period. In other words, we did the analyses that Dr. Swanson did, '67 through 2006, and then we did '68 through 2006 and '69 through 2006 and so forth.

What I'm showing on slide 19 is the analysis for the period that's typically referred to as the post decline period. We've come across that already in this hearing. And so these are just the data from the last quarter century, roughly. And you can see there is no relationship at all. The R-squared, you're getting close to a circle there with an R-squared of .06. And the P value is much higher than is

commonly accepted as indicating statistical significance.
Q. So what would you conclude about the relationship between December and March exports and subsequent fall midwater trawl based on this analysis?
A. I would conclude that based on the last quarter century's worth of data, there isn't any relationship. In fact, any period after about 1975 or so, there's no statistically significant relationship. The correlation that Dr. Swanson shows is driven by the data, the extreme data points that occurred four decades ago.
Q. You depicted similar data on slide 20. Could you explain what that is for us, please?
A. Yes. We've, in all the other graphs I've shown the logarithm of the fall midwater trawl. And that has the effect of reducing -- it may be necessary to do the statistical analysis, but also has the effect of reducing the variation.

So if you want a better visual picture of the relationship between fall midwater trawl and the December-March exports, that would be shown on the lower left side of slide 20 for the period '81 through 2006. And then for the decline period for delta smelt, '99 through 2006, that's the graph on the lower right. And there is no relationship in either case.
Q. All right. In Dr. Swanson's declaration, Plaintiffs' Exhibit 4, she describes a second statistical analysis in

paragraph 44 of the declaration.

Have you reviewed that analysis?

A. I have.

Q. And does slide 21 reflect your impressions of that analysis?

A. It does. Dr. Swanson added a second factor. And I've shown, with a little diagram on the bottom, the first analysis that I just reviewed was relating to the December-March exports to subsequent fall abundance. This is roughly a year that's shown on the bottom. And what Dr. Swanson did for her second analysis was to add an additional variable, which was the summer abundance as measured by the Summer Townet Survey.

Q. And what's your view of this analysis?

A. Well, I don't -- it's a strange thing to have done, you know, if I'm trying to establish a relationship between December-March exports and fall abundance, it's -- to me, it's a strange thing to do to add summer abundance as a factor. Leaving aside whether it's strange or not, that second relationship also doesn't work in more recent years. So, for example, in the last 26 years, '81 through 2006, there's no statistically significant correlation for that relationship.

Q. Dr. Miller, in summarizing your first opinion, you found no important statistically significant relationship between exports and subsequent fall midwater trawl index; correct?

A. That's correct. And that's despite, you know, extensive

searches by numerous analysts, including us, including an analysis where we confine our search to years when we would have expected to find an effect if it occurred, mainly when they were close to the pumps.

Q. In your opinion, is this finding significant to the proposals currently before the Court?

A. Yes. The proposals before the Court, most of them, and there's an implicit assumption in these that there is a relationship between exports or entrainment and the subsequent spawning abundance. And we -- we and others have failed to turn up such a relationship. It's pretty well known that correlations do not necessarily indicate a cause and effect. But if -- in a situation where there is a strong assertion of a cause and effect, then a correlation, some sort of correlation should be apparent. There should be some way to, in a quantified way, statistically confirm that the relationship exists. And no analyses have done that.

Q. Dr. Miller, have you done additional analyses that have identified an alternative explanation for decline of the delta smelt?

A. When we began to -- when we began to not turn up a relationship with exports, we turned our attention to what could be the factor that is affecting delta smelt abundance. And that's the subject of my second opinion.

Q. All right. Does slide 23 summarize your second opinion?

A. It does.
Q. Can you read that for us, please.
A. Yes. There are important and statistically significant relationships between spring or summer co-occurrence of delta smelt and their prey and subsequent spawning abundance.

So food density is very important to subsequent delta smelt abundance.

Q. What are the bases for this opinion?
A. There are three bases. The first is an analysis we did for the July co-occurrence of smelt and prey and its relationship with the subsequent fall midwater trawl abundance.

The second analysis was between the spring co-occurrence of delta smelt and prey and the subsequent fall midwater trawl abundance. And the third analysis was for a different species, longfin smelt, which is related to delta smelt. And we found an even better relationship for the spring co-occurrence of longfin smelt and subsequent spawning abundance.

Q. Let's turn to your first analysis of the summer food effects. Can you tell us how you undertook this analysis?
A. We started this analysis because of a hint, I suppose you could say, from Dr. Bennett who had autopsied 100 and some odd delta smelt from past years and found physical evidence of food limitations effects in the summer. And his conclusion

was that there was some sort of bottleneck for delta smelt in the summer.

From talking to Dr. Bennett and reviewing papers on the -- what delta smelt eat, we found that the two species that they were thought to feed primarily on in the summer were two alien zooplankton, Eurytemora, which was introduced probably with the striped bass in late 1800s or 1900s and was the primary food for delta smelt and other species of fish for most of the last century.

The Eurytemora in the summer were essentially wiped out by the Asian clam invasion of 1986. But in '86, another zooplankton, Pseudodiaptomus was also introduced and it -- its abundance increased sharply and then there was a sharp decline beginning about 1999.

Q. Dr. Miller, last week you heard testimony from Dr. Moyle that he had heard information that recent collection of delta smelt showed that they were well fed and in good condition. Since that testimony, have you asked Dr. Bennett about that?

A. I did. I called Dr. Bennett. We had a long conversation. And I asked him -- I told him about what Dr. Moyle had said and asked him if he could -- if he knew why Dr. Moyle would have said that. And he said he thought that probably Dr. Moyle was referring to a presentation that Dr. Bennett's colleague, Swe Te, had made at last year's CALFED science conference late in the year where Swe Te presented information

indicating that adult delta smelt were not showing signs of food limitation.

Of course we're not -- haven't found food limitation effects in adult delta smelt and, as far as I know, no one expects those to be found. Where we found food effects was in the spring and in the summer, so there's not necessarily anything inconsistent between what Dr. Moyle was referring to and what we have found.

Q. How did you go about analyzing the summer food effects described in slide 25?

A. The agencies select data on the densities of zooplankton and the abundance of delta smelt -- densities of delta smelt in the summer in the Summer Townet Survey. And it turns out that data are consistently collected in July, but not necessarily consistently collected in June and August. So we chose July as the summer month to focus on. We divided the habitat of the delta smelt into areas, I believe there were 11 areas, and we reasoned that for smelt to survive in the summer, you must have smelt in the presence of adequate food.

So we essentially were using two key factors. One was the abundance on -- I should say relative abundance. We weren't estimating the population of delta smelt, we didn't have to get into that quagmire. We were estimating relative abundance of delta smelt in each of these areas in July and in each of these areas -- or in general, the average prey density

encountered by smelt. So that in July, the more smelt -- all things being equal, the more smelt you had in July, the more smelt you would expect to have in the fall. That's not a surprise.

And the more prey you have co-occurring with those smelt or overlapping the smelt, then the more smelt you would expect to have in the fall. We were essentially making a simple assumption that survival of delta smelt from this summer bottleneck that had been identified until the fall varied more or less linearly with the density of prey that they had, they were exposed to or that they encountered in July.

Q. And having sampled that data, did you analyze it using regression analysis?

A. We did.

Q. Is that depicted in slide 26?

A. It is. Slide 26 shows, on the Y axis, the fall midwater trawl index and on the X axis it shows this accommodation. The measure of the overlap or co-occurrence of delta smelt and their two primary prey, Eurytemora and Pseudodiaptomus. This is a reasonably good R-squared, it's highly significant with P values very, very small.

We also have checked this by taking the logarithm of these values. We get a highly significant correlation. The R-squared is not quite as high, it's about .5 or so and we

have also done it for periods -- this one covers the period of '81 through 2005. We've also done it for more recent years. It actually turns out to stronger relationship in recent years. We also extended the relationship back no 1972. The relationship is not as good, but it's still highly statistically significant.

So this indicates that this co-occurrence of smelt and prey in July has been important to the subsequent abundance of delta smelt for many years and it continues to be important.

Q. Why did you analyze the month of July?

A. Because we didn't have delta smelt data in all the years in June or in August. We had them in all years except 1988 for July.

Q. And why not extend the analysis past 2005?

A. Oh, that's a good question. The 2006 data on Eurytemora and the 2007 data on Eurytemora from the 20 -- from the -- oh, I'm sorry. I'm sorry. In this case, we did this analysis in 2006 and haven't updated it for 2000 -- including the data for 2006.

Q. Does the relationship change if you add 2006?

A. I don't think so. It -- well, we haven't done it, so I can't say for sure. But based on the fact that it seems to be getting better the fewer years you take in the past, I don't think there's any reason to believe that it's changed.

Q. What is shown in slide 27?
A. Slide 27. Slide 26, where we turned out this importance of co-occurrence, prompts the question, well, what has happened to these two zooplankton that delta smelt feed on over this period? And slide 27 shows the average density to which delta smelt -- that delta smelt encounter for Eurytemora in the gold and Pseudodiaptomus in the blue.

And there's several things you can note from this graph. One is that Eurytemora was abundant and Pseudodiaptomus was absent in the -- roughly the first half of this period. Pseudodiaptomus had not been introduced yet. It was not introduced until 1986. And then in 1986, the Asian clam came in and you can see what happened to Eurytemora densities in July. They were essentially zero and have been. And then Pseudodiaptomus was introduced in '86. And you see on the blue line they started sampling for it in '89 and it increased in abundance and then began a decline.

And you can see in the recent period when we have the delta smelt decline, that Pseudodiaptomus densities have been low and Eurytemora densities have been zero. They've been zero for many years.
Q. All right. This graph indicates that Eurytemora density in July is very low. Does that mean Eurytemora is no longer found in the Delta?
A. No. As I'll get to in the next analysis, they hang around

somewhere and they show up in the spring. They're quite abundant in the spring until May or June and then they are gone every year.

Q. All right. And there are gaps in the graph for Eurytemora. Why are there gaps there?

A. We didn't have -- to calculate the average density of Eurytemora or Pseudodiaptomus that smelt encounter, you have to have data on the distribution of smelt. Otherwise you end up with 15 graphs, one for each area, and it's very cumbersome. So this is a convenient way to show that. So if you're missing years, any years where you're missing delta smelt data or Eurytemora data, you cannot produce the estimate on the -- shown on the gold line.

Q. Let's turn to your second food limitation analysis. Slide 28. Having done the July analysis, you did a second analysis for earlier in the spring; correct?

A. We did. Dr. Bennett also had found evidence of food limitation in the spring. So we repeated this co-occurrence analysis for delta smelt and prey in the spring, in late April.

Q. And are your findings from this analysis depicted in slide 29?

A. They are. In this case --

Q. Can you describe slide 29 for us, please?

A. I'll try. This graph, the relationship that we got is

shown at the top of that graph where the equation, it says fall midwater trawl equals minus 101.6 and so forth.

And as you can see, on the right-hand side of that equal sign, there are two factors. One is the average late April Eurytemora density that smelt encountered. And the other the previous fall midwater trawl.

So what this relationship is saying is that the fall midwater trawl depends on two factors, the previous fall midwater trawl and the late April Eurytemora density that smelt encounter. Because that would be a three dimensional graph, which is a little difficult to deal with. What I did here was to show the goodness of fit by plotting out the actual fall midwater trawl for -- this analysis works for 1997 through 2005. So the data that we use don't go back as far as for the previous analysis, we're using a 20 millimeter data here. But it shows -- the black line is the fall midwater -- the actual fall midwater trawl index and the gray line shows the fall midwater trawl index predicted using this equation.

Q. This -- you report here an R-squared of .85. Correct?

A. Yes.

Q. What does that indicate?

A. That means that the -- these two factors, the late April Eurytemora density and the previous fall midwater trawl, explain 85 percent of the variation in the subsequent fall

midwater trawl, which given the random -- inherent random variation being made at this time, in my opinion essentially explaining all of the variation in the fall midwater trawl.

So this -- this analysis indicates that if you know the previous fall midwater trawl, you know the relative abundance of delta smelt in the fall, and you have some idea of the relative -- of the Eurytemora density that they will encounter after they have spawned and they're -- the larvae and juveniles are produced, that the average Eurytemora density of those larvae and juveniles encounter in late April. If you know those two things, you have an excellent chance of predicting what next year's fall midwater trawl would be.

Q. And that's without regard to what project operations were; correct?

A. Yes. The R-squared is so high that there's really no variation left for any other factor to explain. We've tried to put exports or other factors in to this equation and they turn out not to be statistically significant.

Q. What does this graph indicate in terms of what is happening in April in the Delta to delta smelt?

A. I think the best picture of that would be on the next slide. This shows the average Eurytemora densities encountered by smelt in late April, beginning in 1995. And you can see this dramatic decline beginning in '99 and dropping to this very low level and continuing on through

2005. And this is the case where we no longer have -- we don't have the data for 2006/2007 yet. I would -- I'd be very interested in seeing those data because I think what they will show is that the Eurytemora density is very low.

Q. Who collects the data?

A. The interagency pelagical program collects the data.

Q. And has the data been gathered in the surveys?

A. It has.

Q. Why isn't it yet available?

A. I think the guy who did it left or something. But it's -- they haven't been able to get the data analyzed.

Q. All right. Dr. Miller, I'd like you to describe for the Court your third analysis regarding the food limitation.

A. We expected that if we got this good relationship for co-occurrence in the spring for delta smelt, that we would -- we ought to see a similar relationships for longfin smelt, which is a related species that also feeds on Eurytemora. And so we essentially repeated the analysis this time using the data for longfin smelt.

Q. And is the result of that analysis depicted in slide 32?

A. Slide 32 shows the results of that analysis and an even better correlation than the one we got for delta smelt.

Q. And what's the R-squared for this --

A. .93.

Q. I'm sorry?

A. .93.
Q. And what again does that indicate?
A. Well, that indicates we're getting to the point where there's almost an exact relationship between these two factors on the right and the factor on the left, which is the subsequent fall midwater trawl -- or the subsequent -- which is, as I said before, the best measure of the spawning abundance of delta smelt.
Q. Dr. Miller, can you summarize for us, then, as depicted on slide 33 what you believe are the implications of your analysis of the food limitation.
A. In the delta smelt decline years, essentially all the variation in the fall midwater trawl index is described by two factors. The previous year's fall midwater trawl and the average Eurytemora density encountered by delta smelt in late April.

So in my opinion, based on this analysis, identifying the causes of late April Eurytemora decline is the key to saving delta smelt. It also indicates that other factors, including exports, have been relatively unimportant. If they were important, they would have shown up in this analysis and they didn't. And these relationships explain so much of the variation in the fall midwater trawl that they leave very little variation to be explained by any other factor, including exports.

Q. Dr. Miller, I'd like to turn to your third opinion.
A. My third opinion is that interim remedies proposed by plaintiffs and others are not likely to make a meaningful difference to the number of delta smelt that will survive to spawn in 2009.
Q. And what is the basis for that opinion?
A. The basis is the analyses that I've just reviewed. There's no evidence of statistically significant important effects of exports on subsequent spawning abundance of delta smelt. The process used in recent years for managing exports to affect delta smelt abundance is more than adequate. That's the process that resulted in the data that we have analyzed that showed no effect.

And the real problem with delta smelt declines -- delta smelt is declined with prey densities. This means that you could -- you could, for example, enact remedies directed at exports or Delta outflow and the abundance -- subsequent abundance of delta smelt may go up. It may go down. It may stay the same. There's no reason from the data to believe that the -- those remedies would have any substantial effect.

Q. Dr. Miller, before we conclude, I'd like to ask you a few questions about population estimates. Do you believe it is possible to accurately estimate the population of delta smelt?
A. I do not.

Q. Do you believe it is possible to make a useful estimate of the population of the delta smelt?
A. I do.
Q. Could you please explain the distinction?
A. Well, an accurate estimate would be one where whatever number you produced was such that you had a high degree of confidence that it wasn't much larger and it wasn't much smaller. The actual population is not much smaller or much larger than the number you produced.

A useful estimate -- perhaps best to give an example, let's take the 20 millimeter survey from which several of us have developed estimates of the population of juvenile delta smelt. This survey, according to the website, describes the survey, it consists of pulling a net in a diagonal fashion from the bottom to the top. And I have never heard any biologist be concerned that that net is attracting delta smelt. Just the opposite. What the typical concern is that delta smelt can avoid that net. For example, the clearer the water is, the better chance they have of seeing that net and avoiding it.

So that case, this net is dragged out at a station and we get two numbers from that tow. We get the number of delta smelt that are captured in the net and we get an estimate of the amount of water that passed through the net.

So from those two, we could estimate the density of

delta smelt in the area in which the tow occurred. And because we're reasonably certain that that gear was less than 100 percent efficient, we would be reasonably certain that the estimate of density that we obtained was low.

So that if we use those kinds of estimates so -- and when you accumulate it down, we combine them over all the stations at which delta smelt were caught, we would expect that the number we produce is going to be a low estimate of delta smelt. We may have no idea how low it is because we don't really know what the gear efficiency is, other than to say it's less than 100 percent.

But a low estimate might be very useful to us. If, for example, we could -- if we had estimates of the number of delta smelt killed some other way and at the same time that -- as when we produced the estimate, such as by entrainment, you could -- I don't think we have that number. But if we did, we could compare that entrainment estimate, which if we were making it, we'd want it to be high, right? We want to make sure it was high, not low.

So we'd be comparing an estimate of entrainment that we thought was inaccurate, but were reasonably certain was high, with an estimate of delta smelt abundance that we knew was inaccurate, but had reasonable confidence that it was low. And if, in that comparison, it turns out that entrainment is a small fraction, a small percentage or trivial part of the

population, we can reach a very important conclusion without ever having produced an accurate estimate.

Q. Did you make an estimate of the delta smelt juvenile smelt population as of July -- early July, 2007?

A. I did.

Q. And was that in response to the Court's questions?

A. Yes, it was.

Q. And do any of the opinions you've expressed today depend upon that estimate?

A. No. It was done simply because it was requested.

Q. Did you make an estimate of delta smelt abundance in 2002?

A. I did.

Q. And what was the context for making that estimate?

A. We had been working on delta smelt for a while. And at that time, those were the good years for delta smelt, the population was high, the smelt had met the recovery criteria that had been set forth in the recovery plan that had been developed earlier by a group chaired by Dr. Moyle.

And we developed an estimate of adult population because there wasn't one. And because -- and in combination with that estimate, we also estimated the probability of extinction of delta smelt, we analyzed trends in abundance, and we submitted that to the Fish & Wildlife Service and --

Q. And how were those received by the Fish & Wildlife Service?

A. It was not well received at all.

Q. Did you have any --

THE COURT: What's your explanation for that?

THE WITNESS: Actually, that was the next question, I think. The -- I think -- there were -- there was some significant problems with the analysis that we did. For example, we concluded that delta smelt had a low probability of extinction. And now here we are five years later, where I think the common opinion is that they have a higher probability, a high probability of extinction.

And I think that we were dealing in part with the problem I just went over, which is, you know, if you can't -- if you can't produce an accurate estimate of the population, you shouldn't produce one at all. And, in fact, what we were trying to produce was -- and what we called our estimate was a reasonably low estimate.

What happened with this work was that Fish & Wildlife Service asked the United States Geological Survey to conduct a peer review. Something that was called a peer review for this work. And the peer reviewers were highly critical of what we had done. And we had serious concerns about how that process was conducted. Typically --

THE COURT: On what basis? On the basis of the science you used or on the basis of the data? Or something else?

THE WITNESS: All possibilities, I would say. They did not like the idea that we had developed an estimate of the population, adult -- it was adult spawning population, using data from the Fall Midwater Trawl Survey that had a net, gear that everybody knew was inefficient.

So we attempted to account for the inefficiency of the gear and they did not like the method we had used to account for the inefficiency of the gear. I think that was the basic problem that they had with the population estimates.

THE COURT: Let me ask you an overbroad question.

THE WITNESS: Sure.

THE COURT: But you've been studying the species for more than ten years and doing these analyses that are statistical. How does the data that you've used and the findings that you've made compare to what is out there in, if you will, the universe of data developed by peers who are engaged in the same work that you are? Is it the same? Is it different or something else?

THE WITNESS: The -- we all basically use the same data. The data is collected by the agency. So we don't go out and collect our own data. We use the same data that everyone has. We do analyses that in some cases replicate the analyses that others have done, as I did with Dr. Swanson. And in some cases, we do analyses that no one has done yet. As with these co-occurrence analyses.

THE COURT: The analyses that you do that are comparable reach the same or similar results?

THE WITNESS: Let's take the co-occurrence analysis. The summer co-occurrence analysis that I just described, the one for July. We sent that analysis -- obviously we sent it to Dr. Manly and he re-did the analysis. And confirmed our findings.

We sent it to Dr. Wim Kimmerer, he replicated the analysis and, in fact, encouraged us to get it published in a peer review journal, which we intend to do. Because he wanted to make use of that analysis in papers he was writing.

Those -- those are two examples of where people have replicated. But in some cases, the analysis we've done have simply not been done by others. We are engineers, so we have a peculiar way of looking at things.

BY MR. O'HANLON:

Q. And what is the response? Is this something that is said by the others who are studying it -- and I'm talking now about the agencies, and their scientists, is this something that is not generally accepted within the field of science, its protocols and conventions, or is it simply something that they find either not useful or irrelevant?

A. That's a very difficult question for me to answer. I will start answering it and encourage you to stop me if I'm straying from my expertise. But my experience has been that

analyses like the ones I've presented are ignored for quite a while. I'll give you a specific example.

The first co-occurrence analysis that I mentioned for July was presented by me in March of 2005 at the Interagency Ecological Program conference at Asilomar attended by several hundred of the scientists and others who work on these issues. And it was, at the time it was presented, the first analysis ever that showed a statistically significant and mechanistically reasonable relationship between any factor occurring before the fall and the fall midwater trawl index. And we got -- there was no interest in it. We got no requests for the information. No requests for the data. No requests for the PowerPoint presentation for about a year.

And during that time, we continued to present this analysis at other forums. And eventually the analysis began to work its way into the presentations made by the Pelagic Organism Decline program, for example. So that's why the question is difficult to answer because the -- my experience is that the typical thing that happens with an analysis like this is it's -- it's ignored.

THE COURT: Let me ask: Are you using math and science that is outside the generally accepted scope of biological inquiry and analysis such that it would not be deemed valid for the kind of study that you're doing?

THE WITNESS: I don't think so. You know, this is

pretty straightforward. You know, you -- the idea of overlap analysis or co-occurrence analysis is not uncommon in fisheries biology. It's a perfectly reasonable thing to do.

THE COURT: And to the subject of peer review or general acceptance, to what extent is there acceptance of what you just presented in the community that's studying the delta smelt?

THE WITNESS: I think now there's general acceptance of the July co-occurrence analysis that we did. The spring co-occurrence, the one for delta smelt, the one for longfin smelt, I presented actually the -- only the one for delta smelt I presented on June 12th at the Estuary Ecology Team meeting and as with the July co-occurrence, we heard -- we had no requests for the data or the presentation of the analysis.

THE COURT: And as to this opinion that, in effect -- and I'm going to use my words, not the scientific terms that you've used, that the conclusion as to the abundance being unrelated, at least statistically --

THE WITNESS: Right.

THE COURT: -- to project operations versus -- I'm going to use the word primary cause or significant cause, but the, if you will, the efficient proximate cause -- that's a legal term -- of the decline in abundance is the food density, what's the acceptance of those opinions in the delta smelt community?

THE WITNESS: This will be pretty subjective on my part. But as for the lack of correlation with exports, I think there's quite a bit -- there's growing acceptance of that. To be fair, I think that the growing acceptance comes with a condition that I've heard expressed, which is the possibility that in a year, for reasons that are poorly understood, most of the delta smelt population or a large fraction of the delta smelt population was close to the pumps, then I think there would be -- what I've heard are reservations about it.

But on the other hand, when we tried to account for that, we still did not find -- could not find effects.

THE COURT: And on the second opinion?

THE WITNESS: The second opinion -- I'm sorry, on the second opinion, oh, about the importance of food or the dominance of food in the --

THE COURT: Yes.

THE WITNESS: I don't think that's -- well, it's evident from the testimony here that it has not been accepted. There are -- this is a version of that story that I am telling that's based on our analyses. I don't think it's a version that you would hear from some biologists.

THE COURT: All right. Well, I'm talking about --

THE WITNESS: I haven't surveyed them all.

THE COURT: -- the Delta Smelt Working Group, the

Water Operations Management Team, the DWR scientists, all of whom are charged with responsibility to protect the species. That's the community I'm talking about.

THE WITNESS: Again, I -- the Department of Water Resources had floated a proposal to try to build a facility to grow Pseudodiaptomus in the summer. So that -- I mean, I don't think they're going to do that.

THE COURT: All right.

THE WITNESS: I don't think it's a great idea myself. But in any event, that would indicate some degree of acceptance. But I think you can get -- you can go over the complete spectrum with biologists.

THE COURT: Now let's take your opinion that says all these measures that are proposed, forget about it because they're not going to do any good, they're unrelated, so let's just put those in the circular file. And what's the alternative? We all stand by and watch the species go extinct? Do you have an answer?

THE WITNESS: I do. I do. This -- this requires backing off on the problem somewhat. But in my opinion, I would -- insofar as export effects go, I would want to make sure that I have a process that could deal with the possibility and prevent an unusually large entrainment again. You can argue --

THE COURT: What would that process be?

THE WITNESS: Well, it would be the process that we have in existence. But I would want to make sure that it was considering many of the things that have been proposed in these interim measures.

So I -- I would want to have that as an insurance policy. If something really strange happens --

THE COURT: I'm not trying to put words in your mouth.

THE WITNESS: Go ahead.

THE COURT: But are you saying that you don't disagree with some kind of flow maintenance regime for protective purposes, but it should be the most prudently conservative so as to balance all the interests?

THE WITNESS: Well, I -- that would be putting a few more words in my mouth than I'm comfortable with. I would say that what these data indicate is that the routine year in year out, day in day out, week in week out management of exports to minimize entrainment of delta smelt is -- is really not producing any measurable effect. That's what the data would indicate.

So I would -- I would not want to be wasting my time and effort and water resources trying to do that. On the other hand, I would want to be careful, given the condition of the species, that I was alert to the possibility that some unusually large entrainment event could occur and I would want

to know that I would detect --

THE COURT: Will you accept a fail safe?

THE WITNESS: That -- okay. I can --

THE COURT: Live with that?

THE WITNESS: Yes. Yes.

THE COURT: And then how do we define it?

THE WITNESS: I don't know. I would want, you know, to talk with --

THE COURT: Do you reject all of the opinions of the others who have studied it and have essentially presented their, if you will, best efforts at that?

THE WITNESS: Well, I don't know -- I wouldn't go so far as reject. That's pretty harsh. I do think there is a difference -- maybe this goes back to the difference in approach, that Mr. O'Hanlon asked me about earlier. I've noticed that biologists, because they're dealing with very complex systems, they are much more inclined to rely on their opinion, their gut feeling, their combined experience over many, many years. I'm an engineer. I wouldn't do it that way. I would be uncomfortable doing it that way.

THE COURT: But it has to be --

THE WITNESS: Mine is to always get the numbers. Always get the numbers.

THE COURT: But it has to be done some way.

THE WITNESS: I agree with that. I agree with that.

THE COURT: But presently you don't have a proposal as to how to do it?

THE WITNESS: Exactly how to do it, no.

THE COURT: All right. Then I can appreciate your candor.

As to the opinion about project operations, put that aside and let's focus on what you think the major cause is. What is to be done about that, food supply?

THE WITNESS: Two things, I think. First, I would immediately establish a refuge population of delta smelt of about a million or so in two locations, so you wouldn't have the threat of getting wiped out by disease, or you would minimize that threat.

BY MR. O'HANLON:

Q. Is that feasible with an annual species?

A. I think it is. The delta smelt culture facility now is producing about 20,000 adults a year. And they're -- they've got pretty good at it. So this would be --

Q. Is this a domestic farm that actually -- it's a hatchery type fish?

A. Yes. Yes. They capture delta smelt out in the Delta and they are now capable of growing them through several generations. And they can produce about 20,000 adults. So it's a process of scale-up. It's not a process of figuring out how to do it, but I would --

THE COURT: That's lawsuit, too, won't it? I'm being facetious, I'm sorry. And what's the other proposal?

THE WITNESS: The other thing I would do is now we have this focus on exports. We have data coming in on exports. We are sampling the distribution and abundance of delta smelt. And all of that is focused on what do we do with the exports.

If the problem is food, in my opinion we need a similar effort directed at that problem. So, for example, rather than having, you know, it be August of 2007 and we don't have the 2006 data for Eurytemora. We need a process that turns the Eurytemora data around in a week, the same way we turn around data related to exports. We need a process that takes these delta smelt that are caught and runs them through Bill Bennett's smelt physical process. What is their condition? Do they show evidence of toxic effects? Are they starving?

We need to couple that with a similar analysis of the waters in which the delta smelt were found. Are there contaminants in those waters? What is the density of food? We need to turn those data around. We also need to analyze -- we need to be doing toxicity testing on the smelt and their prey on an ongoing basis using waters from the Delta.

THE COURT: All right. So that's the sampling. The

monitoring.

THE WITNESS: Sampling. Monitoring.

THE COURT: To increase some of recommended and even additional areas.

THE WITNESS: Right.

THE COURT: How about providing the food supply, how does that work?

THE WITNESS: I don't know. Because we have, I think, pretty clearly identified that food is the major factor. Okay? But the problem is we don't know what's wrong with the food. You know, I tried -- as soon as we found the food effect, we started working on what affects food. And we tried a whole bunch of flow and export variables. Searching for relationships between those variables and food densities. And we didn't find anything. So I suspect that it's something else that's affecting the food.

And my reason for recommending a comprehensive program of the type, this monitoring program, I think that program should feed into the decision process the same way the current one does. The DAP and the Delta Smelt Working Group and so forth --

THE COURT: But you're not a biologist?

THE WITNESS: No.

THE COURT: So you can't say if there is some zooplankton species that can be created that can survive all

the threats that are out there --

THE WITNESS: No.

THE COURT: -- to feed the fish?

THE WITNESS: No. I would -- based on the proposal that the Department of Water Resources made about growing Pseudodiaptomus, I mean, that fell flat as far as I know. So -- and the biologists did not like the process.

THE COURT: Thank you very much Dr. Miller.

THE WITNESS: Your welcome.

THE COURT: You may proceed.

MR. O'HANLON: Thank you, Your Honor.

Q. Dr. Miller, I'd like you to turn to slide 36. Is that essentially a summary of your opinions?

A. Yes.

Q. All right. Could you read that for us, please?

A. If exports were as important, I assume there should be at least one valid correlation indicating important effects of exports on delta smelt abundance. That would be the spawning abundance. And despite extensive searches by numerous analysts, no such correlations have been found.

In contrast, highly significant correlations exist with prey, that is food density, indicating important effects on delta smelt population models.

MR. O'HANLON: Your Honor, I would move San Luis Exhibit C, which is a copy of the PowerPoint presentation into

evidence.

THE COURT: Any objection?

MS. KYLE: Hearsay objection, Your Honor. Not for the truth.

THE COURT: I'll admit it as a demonstration, an illustration of testimony. I'm not accepting it essentially for underlying data that's offered for the truth. However, I will consider it for its persuasive effect as it explains, illustrates or otherwise demonstrates the testimony of the witness. Objection is sustained in part.

(Defendants' Exhibit SL C was received.)

THE COURT: Probably about all we need, don't you think, Mr. --

MR. O'HANLON: I'm sorry, Your Honor?

THE COURT: I said that's about all we need.

MR. O'HANLON: Yes, I agree, Your Honor, that's the purpose of the PowerPoint presentation, to illustrate the testimony. Thank you.

THE COURT: All right.

MR. O'HANLON: I do have a couple more exhibits, Your Honor, I'd like to have marked as Exhibit San Luis F.

THE COURT: Which is?

MR. O'HANLON: This is a diagram prepared by Dr. Miller.

(Defendant's Exhibit SL F was marked for

identification.)

MR. O'HANLON: May I approach the witness, Your Honor?

THE COURT: You may.

BY MR. O'HANLON:

Q. Dr. Miller, did you prepare what is marked as San Luis Exhibit F?

A. Yes, I did.

Q. Can you tell us what is depicted in -- it's a three-page document; correct?

A. That's correct.

Q. Can you tell us what is depicted in the first page?

A. First page shows four graphs and each graph plots the same two variables, but for different time periods. The first graph on the upper left covers the period 1967 through 2006 and then to the right, 1980 through 2006. Lower left is '87 through 2006 and lower right is '97 through 2006.

And each graph plots on the Y axis the log of the fall midwater trawl and on the X axis the log of the September/December Delta outflow. So this is December outflow and fall midwater trawl in the same year, the same fall.

Q. Is it your understanding that the plaintiffs' proposed action number ten would impose a fall outflow requirement?

A. Yes.

Q. And did you -- using this exhibit, did you analyze whether

in the past years higher outflow in the fall has resulted in higher delta smelt abundance as reflected in the fall midwater trawl index?

A. It -- these graphs clearly show there's no relationship between the September-December Delta outflow and the fall midwater trawl in the same year. It wasn't clear to me whether the proposal was related to the fall midwater trawl in the same year as the outflow or in the subsequent year.

Q. All right. So the first page of Exhibit F shows us data for fall midwater trawl and the September to December outflow for the same year?

A. That's correct.

Q. Okay. And does the second page of Exhibit F show us the same information except that the fall midwater trawl information is for the subsequent year?

A. That's correct. And again, there's no relationship.

Q. And finally, can you explain for us what is on the third page of Exhibit F?

A. What's on the third page is just the same as what's on the second page except I didn't take the logarithm of the fall midwater trawl index. And again, you get the same lack of relationship.

THE COURT: All right. Any objection to this exhibit?

Exhibit F is received in evidence. San Luis F.

(Defendant's Exhibit SL F was received.)

MR. O'HANLON: Thank you, Your Honor. Your Honor, I would last like to have marked as Exhibits G and H, Dr. Miller's declarations. I'd like to have marked as Exhibit G Dr. Miller's July 23rd declaration, document No. 407. And as Exhibit H, Dr. Miller's August 13th declaration, document No. 465.

THE COURT: Any objection?

MS. KYLE: Yes, Your Honor. As to the second declaration, I believe one of the attachments, assuming that he's moving to enter the attachments, is the paper by Dr. Manly, I don't believe that he's laid a foundation for that.

THE COURT: I will admit SL G into evidence.

(Defendant's Exhibit SL G was received.)

THE COURT: As to SL H, the Manly report, I'm going to sustain the objection. It will be considered only that it was opinion evidence that was relied on by the expert, hearsay informing his opinions. To that extent, it will be considered, but not for the truth of the opinions that were asserted, only as they informed Dr. Miller's opinions. So it's received in evidence subject to that limitation.

(Defendant's Exhibit SL H was received.)

MR. O'HANLON: Thank you, Your Honor. I have no further questions.

THE COURT: Thank you very much.

All right. Ms. Kyle, are you going to examine?

MS. KYLE: Thank you, Your Honor.

THE COURT: You may proceed.

MS. KYLE: Your Honor, I'd like to begin by just voicing a downward objection, 702 speaking objection to Dr. Miller's first and second opinions as laid out in the summary page to the slide show which we just saw. I believe we heard in his exchange with the Court that at least the second opinion has not been generally accepted in the fisheries management committee that works on smelt in the Delta. And neither the first or second opinion has been formally peer reviewed. Dr. Miller is not a biologist. He's an engineer.

THE COURT: All right. Do you want to respond to this objection?

MR. O'HANLON: Your Honor, I believe, as the Court found, Dr. Miller is qualified to provide opinions based on his knowledge, experience and training. He used methodologies, and particularly linear regression, that are well recognized and accepted. There was nothing about his methodology that was described as being untoward or unusual or untested. Rather, it was, I believe, the conclusions that Dr. Miller referred to.

THE COURT: I believe that the objection comes late. You did not ask to take him on voir dire. Secondly, the opinions that were offered by Dr. Miller, although not offered

or accepted by the Court in the field of biology or fishery science, essentially involve the mathematical analysis of data that has been gathered and developed by biologists. And so there's no real objection to the nature of the data.

There's nothing that's unusual or that is without the realm of mathematical science for Daubert/Kumho or any of their progeny. And the fact that the opinions that are now expressed are either not generally accepted or are unorthodox, if that term would apply, goes to the weight, not the admissibility of the testimony.

Therefore, the objections to disqualify the first and second opinions are overruled. You may proceed.

MS. KYLE: Thank you, Your Honor.

CROSS-EXAMINATION

BY MS. KYLE:

Q. Hello, Dr. Miller. I think I forgot to introduce myself. I'm Selena Kyle for the plaintiffs. Good afternoon.

A. Nice to meet you.

Q. Dr. Miller, I believe you testified that around 2002, you did develop some abundance estimates for delta smelt; is that correct?

A. That's correct.

Q. And I believe you described those as the good years for smelt; is that right?

A. Yes.

Q. Dr. Miller, I believe you also testified you were involved, maybe one of the authors of a 2002 white paper on the delta smelt; is that correct?
A. Correct.
Q. Was the title of that paper The delta Smelt and the State of the Science, Dr. Miller?
A. It was.
Q. Dr. Miller, was Dr. Brian Manly also one of the authors of that paper?
A. Yes. Parts of it.
Q. Did Dr. Manly contribute research to that paper?
A. He did.
Q. And that 2002 white paper that you and Dr. Manly contributed to or authored, that argued that the population of delta smelt had been increasing since the mid 1980s; isn't that right?
A. Yes.
Q. And it based -- and the white paper also stated that, based on recent analyses, the population of the sub-adult or fall smelt in the late 1990s could be as high as 12 million at the upper end of the population estimate that you developed at that time; is that correct?
A. I don't know.
Q. Dr. Miller, do you recall whether the white paper stated that there is a compelling argument for delisting the smelt in

your view in 2002?
A. Yes, I believe it did.
Q. Dr. Miller, this 2002 white paper we've been discussing was prepared for the San Luis and Delta-Mendota Water Authority; is that correct?
A. Correct.
Q. And the paper requested -- in addition to stating the conclusions we've just discussed, requested that water allocation decisions that favor the delta smelt be revisited. Is that correct?
A. I believe so, yes.
THE COURT: Do you still hold this opinion?
THE WITNESS: No.
THE COURT: Thank you.
BY MS. KYLE:
Q. Dr. Miller, I believe you testified that that paper was peer reviewed; is that correct?
A. Excuse me. Your Honor --
THE COURT: The opinion that the delta smelt should be delisted.
THE WITNESS: Oh, delisted. I'm sorry. I misunderstood. No, that's not my opinion now.
MS. KYLE: That was not my question. Thank you.
THE COURT: That was my question.
MS. KYLE: Sorry. I just wanted to clarify.

Q. And I believe you said that paper, that 2002 white paper was subjected to peer review; is that correct?
A. Well, as I said, it was -- what was done was called a peer review, I don't think it was conducted in a way that normal peer reviews are conducted.
Q. And that was conducted or overseen, I should say, by the Department of Interior; isn't that correct?
A. I believe that's right.
Q. The Fish & Wildlife Service and the US Geological Survey specifically?
A. Yes.
Q. And those are agencies within the Department of the Interior?
A. Yes.
Q. And I believe you described this peer review -- I don't think those were the exact words and I know you don't necessarily use peer review, I believe you described them as critical; is that a fair characterization?
A. Yes.
Q. And I believe you testified that you thought the primary criticism went to your analysis or treatment of gear efficiency issues?
A. I know that was one of the major criticisms.
Q. Dr. Miller, I know you have a lot of papers in front of you now, but I'm going to ask you, if you can, to find what's

been marked Plaintiffs' Exhibit 4 in evidence. It's the August 13th declaration of Dr. Tina Swanson.

A. I have it.

Q. Dr. Miller, I'm going to ask you if you could turn to Exhibit 1 to that declaration. And I'll find the page number for you.

A. I have it.

Q. Could you just take a moment to look over the first three pages of this exhibit.

A. The first three pages of the --

Q. Actually, please, just look through and if you could just take a quick look at -- through, if you would, the first seven pages.

A. Okay.

Q. Dr. Miller, do you recognize this exhibit?

A. Do I recognize what? I'm sorry.

Q. Do you recognize this exhibit?

A. I do.

Q. It's Exhibit 1. Is this the 2002 peer review of your white paper and a cover letter to that peer review?

A. Yes.

Q. Dr. Miller, the peer review was conducted by a two reviewers from USGS, one from the Fish & Wildlife Service and one from academia; is that correct?

A. That's correct.

Q. And the conclusion of that review, Dr. Miller, was that the paper lacked sufficient scope and scientific rigor; isn't that correct?
A. Yes.
Q. The reviewers --
A. I agree with that.
Q. The reviewers found, Dr. Miller, that the paper's conclusions were not supported by either the data or the arguments presented; is that correct?
A. Yes.
Q. And the peer reviewers -- and I'm speaking about all four of them here -- criticize the white paper for its selected use of data in application of questionable analytical techniques; is that correct?
A. Are you asking me if that's what they said?
Q. Was that the conclusion of the peer review?
A. Yes.
Q. And the reviewers also suggested that the white paper's authors, which would include you and Dr. Manly, based on your testimony, had selected data -- no, excuse me, hold you on that question.

Dr. Miller, the reviewers also suggested that the white paper's authors, including you and Dr. Manly, had ignored the results and implications of their work that were contrary to their conclusions; is that correct?

A. Actually, I'm not seeing that. Can you tell me where --
Q. Sure. I'd be happy to. If you look at -- this would be -- it's the fourth page of the exhibit, which would be the third page of the actual peer review. And there's the heading, bold faced heading at the top of the page that says "Peer review comments."
A. Yes.
Q. And if you look at the first paragraph, the fourth sentence down, it begins "The authors."
A. I see. Yes.
THE COURT: Do you have a reference? I have for Exhibit 1, it starts page 55 of 135. Am I looking at the right document? This is --
MS. KYLE: Your Honor, let me just check. I wasn't working off a copy that has the --
THE COURT: US DOI memorandum of January 12th, 2004?
MS. KYLE: Oh, this would be at 58 of 135, Your Honor.
THE COURT: 58.
MS. KYLE: This heading we just described. "Peer review comments."
THE COURT: Yes. I have it.
MS. KYLE: And then the language we were just discussing in that last question, if you look at the first paragraph, which begins "Overall assessment" and then the

fourth sentence of that paragraph beginning "The authors," it's towards the right margin.

Q. Dr. Miller, the authors -- the reviewers, excuse me, also suggested the white paper's authors had ignored the results and implications of their work that were contrary to their conclusions; is that correct?

A. Yes, I see that as well.

Q. And the reviewers unanimously found the authors had selected data specifically to support only certain points; is that correct? That would be, if you look at the same page we're talking about and look at the first sentence of the second full paragraph on that page.

A. I see that, yes.

Q. So the reviewers unanimously found that you had selected data specifically to support only certain points; is that correct?

A. That's correct.

Q. Dr. Miller, it was the peer reviewers' unanimous assessment that the white paper was extremely weak scientifically; is that correct?

A. I don't know.

Q. Dr. Miller, if I could just have you look at the same page, second paragraph, and I'm just going to read the --

A. Yes. Okay. I see that. Yes. That's what they said.

Q. Thank you. Dr. Miller, going back to your earlier

testimony. I believe I understood you to say that the remedies proposals that plaintiffs and the other parties have presented in this case won't make a meaningful difference in smelt abundance in your view; is that correct?
A. With the qualification that I mentioned in my conversation with Judge Wanger, yes.
Q. And I believe you also testified that --
THE COURT: But as I understand your answer to my question, you're not suggesting that everybody just stand by and let the species go?
THE WITNESS: Absolutely not.
THE COURT: Action needs to be taken.
THE WITNESS: Yes.
THE COURT: Thank you.
BY MS. KYLE:
Q. Dr. Miller, in my understanding, and correct me if I'm wrong, one of your criticisms of those remedy proposals is that in your view, they rely on an implicit assumption that there is a relationship between exports and smelt abundance. Correct?
A. And subsequent fall midwater trawl smelt abundance.
Q. And subsequent fall midwater trawl smelt abundance. And that's the relationship you analyzed.
A. Yes.
Q. Correct?

Dr. Miller, you were here for Dr. Swanson's testimony last week; correct?
A. Some of it.
Q. You heard Dr. Swanson testify about her remedy proposal; is that correct?
A. Some of it.
Q. And Dr. Miller, if you could have you look at actually the same exhibit that you had in front of you a moment ago. It's plaintiffs' 4. But I'm going to ask you to look at paragraph 42, which I believe accompanies the figure that you were discussing in your testimony on this point.
A. Yes.
THE COURT: Paragraph 42? Page 42?
THE WITNESS: Page 34, 135.
THE COURT: Oh, it's the declaration.
MS. KYLE: I apologize, Your Honor. Wrong declaration. The declaration I meant was plaintiffs' 4, that's the August 13th declaration.
THE COURT: That's on page 34?
MS. KYLE: Yes. Page 34, paragraph 42.
THE COURT: Thank you.
BY MS. KYLE:
Q. Dr. Miller, Dr. Swanson didn't base any of her proposed management actions, or I should say remedy actions on this relationship; correct?

A. I don't know.
Q. Dr. Miller, could I have you turn -- this is going to be in the same exhibit that you're looking at, Plaintiffs' 4, which is Dr. Swanson's August 15th supplemental declaration to the appendix. It's immediately following the text. And the numbers at the top, it's page 43 of 135.
Do you have that?
A. I do.
Q. It says at the top -- it's a table of a multiple pages; is that correct?
A. Yes.
Q. And the title of the table is "Revised Recommended Interim Protective Actions for Delta Smelt"; is that correct?
A. Correct.
Q. Dr. Miller, I'd like to have you flip through the table to -- actually, if I could just have a moment -- give you a moment to read through the actions on this table, in particular focusing on the fourth column to the right, the "triggers" column. If I could have you just go through and look over the "triggers" column for actions one through ten.
A. I'm not sure I'm going to be able to thoroughly review the triggers column.
MR. O'HANLON: Your Honor, I object that this is beyond the scope of the direct.
THE COURT: It appears to relate to his testimony if

we get a question. Right now he's just been referred to the exhibit. And so let's wait for a question about the exhibit and then we'll see whether or not it's beyond the scope.

MS. KYLE: My question, Your Honor -- and I just wanted to give Dr. Miller an opportunity to refresh if he wanted it -- was just Dr. Swanson has proposed triggers that are based on specific ranges of flows for the Old and Middle River; is that correct?

And this would be, especially in particular with respect to, if you'd like to flip through actions four, five, six and seven, if you'd like to review them.

THE COURT: Why don't we foundationally ask Dr. Miller. You, of course, analyzed flow data at various volumes of flow. Did you do any analysis of the flows themselves and what their meaning for the project is and what potential effect they have on species affected by the project?

THE WITNESS: I'm sorry. I'm not sure I understand the question.

THE COURT: Your quantitative analysis that you compared uses flows, it uses flow volumes, and it relates them to this Fall Midwater Trawl Survey to determine whether there's any correlation.

THE WITNESS: Yes.

THE COURT: That's, if you will, the crux of your analysis.

THE WITNESS: Yes.

THE COURT: Now, did you make any other study, did you consider in any other ways the flows that are in effect the project operations and how they vary from time to time and for what purposes they vary?

THE WITNESS: The data we used on flows and exports in particular were the flows and exports from the past years.

THE COURT: Understood. You're being asked here to evaluate some essentially triggers for action that relate to flows. And I'm asking you foundationally if you studied the flows in such a way that you can express an opinion on this subject.

THE WITNESS: No.

THE COURT: All right. It does appear that this witness -- this is beyond the scope of this witness' expertise. And therefore I'm going to sustain the objection.

MS. KYLE: Thank you, Your Honor.

Q. Dr. Miller, turning back to your analysis as presented in this discussion earlier. You haven't presented any analysis of the relationship between negative flows in the Old and Middle River and delta smelt abundance as measured by the fall midwater trawl index; is that correct?

A. That's correct.

Q. You looked at the relationship between exports and abundance as measured by the fall midwater trawl index; is

that correct?
A. That's correct.
Q. Dr. Miller, and you haven't presented, to my understanding, any analysis of the relationship between --
A. Excuse me. Your Honor, can I explain?
THE COURT: If you need to explain your answer, you may.
THE WITNESS: My reason for not looking at the relationship between Old and Middle River flows and salvage was because all of our other analyses indicated no statistically significant important effect or relationship between salvage and subsequent abundance of delta smelt. So we saw no need to focus on the relationship between Old and Middle River flows and salvage because we had not been able to determine that salvage was important.
THE COURT: All right. We are going to be taking the afternoon recess right now. Does anybody have anything else for the record? I want to excuse the reporter.
All right. Ms. Reporter, you are excused.
(Recess.)
THE COURT: Please be seated. We're back on the record in NRDC versus Kempthorne. We're going to resume the testimony of Dr. Miller. Ms. Kyle, you may proceed.
MS. KYLE: Thank you, Your Honor.
Q. Dr. Miller, are you familiar with plaintiffs' proposed

remedy actions in this case?
A. Am I familiar with the actions?
Q. With the proposed remedies, plaintiffs' proposed remedies?
A. Generally familiar.
Q. You've expressed an opinion on those remedies; is that correct?
A. Yes.
Q. Dr. Miller, your analysis of the impact of exports of delta smelt abundance turns on analysis of whether there's a relationship between exports and salvage at the pumps; is that correct?
A. I'm not sure I understand the question.
Q. We'd been discussing before the break your analysis of the impact of project operations and specifically exports on delta smelt abundance. Is that correct?
A. Yes.
Q. And your analysis of that effect turns on or examines, I should say, the relationship between exports at the pumps and salvage of delta smelt at the pumps; is that correct?
MR. O'HANLON: Objection. Mischaracterizes the witness' testimony.
BY MS. KYLE:
Q. Dr. Miller, can I refer you to --
THE COURT: Let me rule on the objection. If you could, why don't you rephrase the question. It does appear to

be ambiguous.

MS. KYLE: Perhaps I could just lay a foundation, Your Honor.

THE COURT: Yes.

BY MS. KYLE:

Q. Dr. Miller, could I refer you to your slide show for your testimony, it's been marked San Luis and Delta water authorities C, Exhibit C.

A. Yes.

Q. And could you turn to slide 10, please, Dr. Miller.

A. Yes.

Q. Slide is entitled "Measuring entrainment effects"; is that correct?

A. Right.

Q. And the fourth bullet on that slide, Dr. Miller, reads, "If entrainment is important, this fraction should affect each year's change in abundance, i.e., the change in the FMWT." And by "FMWT," you mean fall midwater trawl; correct?

A. Correct.

Q. And by a "fraction," you're referring to the bullet point above; is that correct?

A. Correct.

Q. And that bullet point reads, "Therefore, salvage divided by previous fall midwater trawl indexes," and I assume there's an equals there, "fraction killed at the export pumps"; is

that correct?
A. I'm sorry. I don't see an equal sign. I thought you said the word "equal," did I miss --
Q. Oh, I -- my interpretation, and perhaps this is wrong, but my interpretation is that the fraction -- to the right of the fraction killed at the export from pumps, you're taking salvage and dividing by the previous fall midwater trawl indexes.
A. Yes. I'm estimating or developing a measure of the fraction of the adult or juvenile smelt killed at the export pumps by use of the ratio of salvage to the previous fall midwater trawl.
Q. And you used that relationship or fraction to determine whether entrainment is important; is that correct, Dr. Miller?
MR. O'HANLON: Objection. Mischaracterizing his testimony. Vague.
MS. KYLE: Dr. Miller, I just --
THE COURT: Do you understand the question?
THE WITNESS: Not exactly.
THE COURT: All right. The objection is sustained.
BY MS. KYLE:
Q. I'll try this a different way, Dr. Miller. Can I refer you to slide three of the same exhibit. Exhibit C.
A. Yes.
Q. This is entitled "expert opinion"; is that correct?

A. Yes.
Q. And this reads -- and correct me if I have this wrong -- "No analyses indicate a relationship that is both important and statistically significant between project exports or entrainment and delta smelt spawning abundance despite extensive searches by many"; is that correct?
A. Right. Right.
Q. Dr. Miller, none of the plaintiffs' proposed remedies in this proceeding turn on levels of exports; is that correct?
Let me rephrase. None of the plaintiffs' proposed remedies specify a particular level of exports; is that correct?
MR. O'HANLON: Objection. Goes beyond the scope of direct.
MS. KYLE: Your Honor, he's expressed an opinion on plaintiffs' remedies.
THE COURT: The objection is overruled. You may answer.
THE WITNESS: Could you read the question back again, please?
THE COURT: Yes, you may read it back.
(Record read as requested.)
THE WITNESS: Not directly. But a number of the remedies essentially result in export curtailments because that's the purpose of the remedy is to curtail exports.

BY MS. KYLE:
Q. Is that the purpose of the remedy, is that your understanding, Dr. Miller?
A. Some of the remedies, yes.
Q. The purpose of the remedies is to curtail exports?
A. The purpose of the -- yes, when you look at what the action is, it's -- what I meant by that is when you look at what the action is, the action is to curtail exports.
Q. But Dr. Miller, the remedies proposed by plaintiffs do not specify a target level of exports; is that correct?
A. Strictly speaking, no. But they propose -- they prescribe levels of -- maximum negative levels of Old and Middle River flows, which can only be met by curtailing exports.
Q. Dr. Miller, I'd like to refer you to Plaintiffs' Exhibit 4. This is Dr. Swanson's August 13th declaration again. If I could have you turn to paragraph 47. That's at page 36 if you're using -- actually either the top or bottom page numbers, it's page 36.

Dr. Miller, I'm just going to read paragraph 47 and I'd like you to follow along and just make sure I get it right. It says, "Despite clear evidence of the significant relationship between seasonal water export rates and delta smelt abundance, export rates are not the only or even the most useful variable for examining the effects of water project operations on delta smelt.

It is a coarse measurement, it does not reflect, respond to, or drive other important variables, such as inflows, in-Delta channel flows, Delta outflows, or the location of low salinity habitat. Most of the recent research and analysis has focused on other metrics of water project operations and of the effects of those operations on delta smelt critical habitat. This is why none of the interim protection actions proposed by any party protect delta smelt by directly modifying export rates."

Did I read that correctly, Dr. Miller?

A. You did.

Q. Dr. Miller, your testimony included some of your analyses of the relationship between certain zooplankton species and projections of the density of those species and delta smelt abundance; is that correct?

A. I think so. I'll go with you on that.

Q. Dr. Miller, you've presented data in your testimony today on the density -- or let me back up. Excuse me. Just data on -- I'll withdraw the question, Your Honor.

Data on two specific zooplankton species; is that correct?

A. Correct.

Q. And those species are Eurytemora and Pseudodiaptomus; is that correct?

A. Correct.
Q. I wanted to ask you, doctor, your conclusion about the relationship between the density of those zooplankton and delta smelt abundance. But perhaps I'll just let you rephrase what -- just offer that conclusion again.
MR. O'HANLON: Objection as to form.
BY MS. KYLE:
Q. Could you briefly summarize your conclusion about the relationship between the density of the two zooplankton species I just mentioned? And --
THE COURT: The question is withdrawn. Can you answer the pending question?
THE WITNESS: The pending question, I can answer.
THE COURT: All right. You may.
THE WITNESS: There were three analyses. The first one I described was between the co-occurrence of delta smelt and either Eurytemora or Pseudodiaptomus in July.
The second analysis that I described was -- described a relationship between delta smelt and the density of Eurytemora -- co-occurrence of delta smelt and Eurytemora in the spring. And the third one was essentially the same analysis for longfin as opposed to delta smelt.
BY MS. KYLE:
Q. Thank you, Dr. Miller. I'd like to return to the co-occurrence analysis. But first I'd just like to back up

and ask a more general question. Is zooplankton abundance -- and if you like, we can just focus on the two specific species that we asked. Is it affected by fresh water influence to the Delta?

A. As I testified earlier, I searched for relationships between zooplankton abundance in the different areas of the Delta and a number of variables. My recollection is I used Delta outflow, Sacramento River inflow, San Joaquin River inflow, eastside tributary inflow, total Delta inflow, eastside tributary inflow minus exports, exports divided by inflow and several others.

And for each of those variables, I averaged them for the seven days preceding the measurement of the zooplankton densities 30 days preceding the estimate and for the water year up to the time the zooplankton sample was taken and I found no statistically significant relationships.

Q. So I just want to make sure I understand your response correctly. Your opinion is that there's no statistically significant relationship between zooplanktons abundance -- zooplankton abundance -- I'm referring right now to the two species you analyzed -- and fresh water influence to the Delta; is that correct?

A. Between -- not exactly. It's between -- I found no relationships between the Eurytemora -- actually, this was Eurytemora densities in the spring time in the various areas

of the Delta that comprise the delta smelt habitat.
Q. Dr. Miller, were you present for the testimony of Dr. Hanson?
A. Some of it, yes.
Q. And I believe you referred to Dr. Hanson during your own testimony in the context of general discussions about your work; is that correct?
A. I did.
Q. I'm not referring specifically to this analysis, but my understanding is you discuss your work with him from time to time; is that correct?
A. We have.
MS. KYLE: Your Honor, I have an exhibit that I'd like to mark. This would be Plaintiffs' 21. This is just for identification, Your Honor.
THE COURT: All right.
(Plaintiffs' Exhibit 21 was marked for identification.)
MS. KYLE: Your Honor, if I may just walk this around. We don't have copies for everybody.
THE COURT: You may.
MS. KYLE: Your Honor, Mr. Lee has requested that I just put the cover page up on the Elmo and I have a second copy here, so I'm going to do that.
THE COURT: All right.

MS. KYLE: Your Honor, may I approach?

THE COURT: You may.

BY MS. KYLE:

Q. Dr. Miller, I've just handed you a copy of Plaintiffs' Exhibit 21 for identification. And what I'd like to do is just have you flip to one of the pages in that exhibit, it's -- the page number is 5:10. It's in roughly two-thirds of the way through the document, I'd say.

MR. WILKINSON: Can you put the page on the Elmo, please?

MS. KYLE: Sure.

Q. Dr. Miller, I'd just like to read, so the text in the left hand column, the first main paragraph on this page. Oh, I'm sorry, I apologize. Dr. Miller, could I have you start by flipping back to the cover page of this exhibit. Plaintiffs' 21 for identification.

And could I have you read the first name under prepared by or next to prepare by on the cover.

A. Yes. Charles H. Hanson.

Q. And could I have you read the date at the bottom of the cover.

A. October, 2004.

Q. And the title of the document.

A. "Assessment and evaluation of the effects of sand mining on aquatic habitat and fishery populations of Central San

Francisco Bay and the Sacramento-San Joaquin Estuary."
Q. Dr. Miller, I'd like to go back to the page I mentioned before, this is 5:10.
A. Yes.
Q. I'd just like to read the paragraph, it's the left-hand column, the first full paragraph there.
MR. O'HANLON: Your Honor, I object. There's no foundation for this document that Dr. Miller knows anything about it or where it came from or who wrote it or anything else.
MR. WILKINSON: Or that he considered it, Your Honor. We join in that objection.
THE COURT: All right. Have you ever seen this study before?
THE WITNESS: I have not.
THE COURT: Do you have any familiarity with it?
THE WITNESS: No.
THE COURT: Have you ever heard about it?
THE WITNESS: No.
THE COURT: There does appear to be a lack of foundation.
BY MS. KYLE:
Q. Dr. Miller, are you familiar -- are you generally familiar with the work of Dr. Feyrer?
A. Dr. -- yes, I am.

Q. I apologize. I do have it. Dr. Miller, if you can find in front of you in the pile Plaintiffs' Exhibit 5. It's an article, title is -- begins "Multidecadal."

A. This might take me a minute. I assume that it's in this pile that was left here in the untidiness of Dr. Hanson.

THE COURT: Should have a pink tag with a 5 on it. Tell you what, in the interest of time, why don't you use mine.

THE WITNESS: I have it.

BY MS. KYLE:

Q. Dr. Miller, do you recognize the names listed at the top of Plaintiffs' 5, the first page?

A. Feyrer, Nobriga and Sommer.

Q. This is an article Feyrer, Nobriga and Sommer wrote entitled "Multidecadel trends for three declining fish species: Habitat patterns and mechanisms in the San Francisco Estuary, California, USA." Is that correct?

A. Yes.

Q. Dr. Miller, I'd like to have you flip to page 729 of the article.

A. All right.

Q. And look at the right hand column, the text at the bottom. I'd just like to read the first sentence that starts in that column. "We found that Secchi depth and specific conductance were important factors explaining the occurrence of delta

smelt and striped bass. While specific conductance and water temperature were important for threadfin shad."

Did I read that correctly?

A. Yes, you did.

Q. Dr. Miller, if I could why now have you turn to page 731 of the article. And at this time look at the left hand column. The last paragraph towards the bottom about six lines up, do you see a sentence beginning "The increase"?

A. Yes, I see that.

Q. Just going to read that sentence. "The increase" --

A. I'm sorry?

Q. Sorry. I was just going to read that sentence and ask you to follow along. "The increase in specific conductance during the study period is likely a function of decreasing river flow entering the estuary during the fall." Did I read that correctly?

A. Yes.

Q. And then same column, the sentence that begins at the very end of the column beginning "Thus." Reads, "Thus, the positive specific conductance trend appears to be the result of water operations; the change could be a consequence of less water released from upstream dams into the system during this time of year or more water exported from the south Delta, or a combination of both effects." Did I read that correctly?

A. You did.

Q. Dr. Miller, is fresh water inflow to the Delta regulated in part by the CVP and SWP operations?
A. Yes.
Q. Dr. Miller, if we could have you turn back to San Luis Exhibit 3. This is, again, your -- excuse me, Exhibit C. This is your slide presentation again.
A. All right. I have it.
Q. And if you could go to slide 12.
MR. WILKINSON: I'm sorry, which exhibit is that? It's very hard to understand what you're saying.
THE COURT: C. It is San Luis C. It's the slide exhibit and the 12 within that exhibit.
MR. WILKINSON: Thank you, Your Honor.
BY MS. KYLE:
Q. Dr. Miller, on this slide, it's part of your assessment of the relationship between salvage and -- adult salvage -- take this in two steps. Starting with the graph at the top left. My understanding is that's part of your analysis of the relationship between adult salvage at the pumps and later abundance of delta smelt; is that correct?
A. Correct. The later abundance being the fall -- well, the percentage change in the fall midwater trawl abundance.
Q. And that's the fall midwater trawl index as a measure of abundance; is that correct?
A. Yes, correct.

Q. And the table on the lower right-hand corner is similar except now assessing the relationship between juvenile salvage of smelt and subsequent abundance as measured by the same index; is that correct?

A. Correct.

Q. And Dr. Miller, if I recall your testimony correctly, you found no statistically significant relationship between these factors; is that correct?

A. I didn't do -- let's see. On this particular graph, I was not showing any statistical analysis. We had done such analyses in other work that I presented, namely the close to the pumps analysis and then previous analyses that Manly had done.

But on this particular page, 12, I was not attempting to show the results of any statistical analyses, but just how the data did not arrange themselves in a pattern that would be expected if adult salvage was important to subsequent abundance.

Q. Dr. Miller, is it your opinion that there is no statistically significant relationship between the data shown on these charts? And I understand that that opinion is not expressed on this slide. I just want to make sure I understand your opinion correctly.

A. Yes.

Q. Dr. Miller, speaking generally about statistical analyses.

If a statistical analysis fails to take into account important factors, multiple factors influencing something -- let me back up.

Dr. Miller, there could be more than one factor influencing smelt abundance at a given time; is that correct?

A. More than one factor affecting smelt abundance, yes.

Q. For instance, the density of one particular kind of zooplankton or the density of another kind of zooplankton?

A. Yes.

Q. For instance. And Dr. Miller, the statistical analysis fails to account for all the important factors that may be influencing something you're trying to measure, in this case smelt abundance, that can tend to mask statistically significant relationships; is that correct?

A. Yes and no. I think if you find a statistically significant relationship and it's a weak one in that the R-squared is fairly low so that a considerable amount of the variation in the dependent or Y axis variable is not explained by the variation in the independent or X axis variable, then you have reason to be suspicious that you haven't included all the important variables.

On the other hand, if, as we found, you get a relationship where the R-squared is extremely high, then you may not have that concern because the relationship that you have -- for the relationship that you have, so much of the

variation in the dependent or Y axis variable is being explained by the independent or X axis variable that there is little variation left to be explained by any other factor, especially given the random variation that is inevitable for data like the ones that we've been using.

Q. I think I understand that, Dr. Miller. Let me just make sure that I do, just by giving another example.

So if you flip to slide 16. This is the same exhibit, Exhibit C.

A. Yes.

Q. And there you've shown what you title the replication of Dr. Swanson's first analysis; is that correct?

A. Yes.

Q. And there's an R-squared value of .27; is that correct?

A. Right.

Q. So if I understand your testimony correctly, that means 27 percent of the relationship between the factors shown in the Y axis or the factors shown in the horizontal axis, the X axis, and the factors shown on the Y axis, the vertical axis, 27 percent of that relationship is explained?

A. Yes.

Q. Doesn't that mean, Dr. Miller, that there's, you know, residual, like a 73 percent here that's not explained?

A. Yes. In fact, when Dr. Manly analyzed this relationship, he was able to produce a better correlation simply by using a

step function so that visually what it looked like on this graph is there would be a horizontal line that was going across the graph at about value 3 on the Y axis until you got out to -- let's see -- well, this -- it would have a value, a high value for the fall midwater trawl up to a certain period of time and a low value after that.

And that kind of model gave a better relationship than this one shown on 16. And, in fact, once you produced that statistical model and then tried to add in December-March exports, December-March exports did not show up as statistically significant.

So what Manly was finding -- and we have replicated Manly's analysis as well. I didn't get into that here because this step change business is a little bit difficult to explain. But we replicated Manly's analysis.

And what it says is once you account for the possibility that there could have been a step change in the fall midwater trawl abundance at sometime in the past, whatever relationship you have, even over all of these years, '67 through 2006, with December-March exports disappears.

Q. Dr. Miller, I'd like to return to the broader principle that there may be multiple factors that could explain --

A. Yes.

Q. -- something that you're looking at like abundance as

measured by the fall midwater trawl index.

Are you aware that Dr. Feyrer, one of the authors of the article we discussed, the 2005 article that's Plaintiffs' Exhibit 5, are you aware that he and his co-authors found a statistically significant important relationship between water quality and subsequent smelt abundance?

A. I am.

Q. And you're aware that Feyrer and his co-authors found a statistically significant important relationship between salinity in the Delta specifically and subsequent abundance?

A. Yes.

Q. You didn't factor that particular relationship or the possibility of that relationship in to your analysis of whether there was a statistically significant relationship between project exports -- and let's refer again to slide 12 here -- exports here expressed as salvage and subsequent abundance?

A. I'm sorry. What are you referring?

Q. If we could turn back to your slide. Let's use the slide that expresses your conclusion.

A. Number --

Q. Slide 22. Dr. Miller, is it still your opinion or conclusion that there's no important statistically significant relationship between exports and subsequent fall midwater trawl index based on your analysis?

A. Yes. That is my conclusion.
Q. And in those analyses, Dr. Miller, you did not factor in the possibility that there is a statistically significant relationship between salinity in the Delta and subsequent abundance; is that correct?
A. Dr. Manly looked at that and I relied on Dr. Manly's analyses. I see no reason why the addition of salinity would cause the relationship between exports and subsequent fall midwater trawl index to become statistically significantly important when it wasn't otherwise.
Q. Dr. Miller, I would like to talk about Dr. Manly for a second, if I could. You've discussed Dr. Manly's work as one basis for the opinions you presented here today; is that correct?
A. Yes.
Q. And, in fact, if I could refer you to slide 7 of your slide show. This is, again, Exhibit C. You say that your analyses -- and here you're referring to your analyses of search for effects on smelt close to the pumps; is that correct?
A. Correct.
Q. And you state here, in the second bullet, those analyses were confirmed by Manly; is that correct?
A. Right.
Q. Dr. Miller, you filed a declaration in June in this case;

didn't you?
A. Yes.
Q. And in that declaration, you presented also some results of analyses of looking at the relationship between salvage and subsequent fall midwater trawl index; is that correct?
A. Yes. I would have to go back and look specifically because I filed two of them. Two declarations.
Q. I believe, if my understanding is correct, there might actually have been three declarations that you filed in this case?
A. That's possible.
Q. Is that correct, Dr. Miller?
A. Yes.
Q. This would be the very first that I'm aware of, the June 21st declaration.
A. Uh-huh.
Q. In that declaration, I believe you stated, Dr. Miller, correct me if I have this wrong, that Dr. Manly concurred with your results there as well; is that correct?
A. Yes.
Q. But Dr. Manly has filed declarations in this case as well; is that correct?
A. Correct.
Q. And he doesn't say in either of his declarations that he did, in fact, concur with those results; did he?

A. On that specific -- that specific point, you mean, close to the pumps analysis?
Q. The analysis in the July 21st declaration, Dr. Miller. Perhaps it would be helpful if I provided you a copy.
A. Sure.
MS. KYLE: Your Honor, I don't believe this declaration has been marked yet. So this would be Plaintiffs' 22 for identification. It's document No. 374.
THE COURT: Whose declaration is it?
MS. KYLE: June 21st declaration of Dr. Miller.
(Plaintiffs' Exhibit 22 was marked for identification.)
THE COURT: Not that I know of. What is your time estimate for cross with this witness?
MS. KYLE: About another hour, Your Honor.
THE COURT: I'm going to suggest that it will not be helpful for the Court to have the another hour of examination of this witness. My sense of this is I do not want to have anybody not presenting a witness that they intended to present. So why don't you try to organize your questioning and compress it into a shorter time frame if you possibly can.
MS. KYLE: Okay. I'll move on, Your Honor.
BY MS. KYLE:
Q. Dr. Miller, I'd like to return to your slide show again. This is Exhibit C. San Luis and Delta-Mendota Exhibit C. And

again flip to the conclusion slide at slide 22.
A. Yes.
Q. So that states, there is no important -- in your opinion, no important statistically significant relationship between exports and subsequent fall midwater trawl index; is that correct?
A. Correct.
Q. In fact, I believe you stated in your July 23rd declaration in this case that you're not aware of any valid analyses showing the that exports or entrainment have a statistically significant important effect on subsequent years' smelt abundance.
A. Correct.
Q. But I believe you've also stated that Dr. Brian Manly and others have found that project operations, which include exports and entrainment, have a statistically significant effect on smelt abundance; is that right?
A. That's correct.
Q. So your opinion, if I understand it correctly, Dr. Miller, is that project operations may have a statistically significant effect on smelt population, but that -- I should say -- let me withdraw the question, Your Honor.
So your opinion, Dr. Miller, is that project operations may have a statistically significant effect on smelt abundance depending on the data that you're looking at,

but that effect is not important. Did I understand that correctly?
A. That's my characterization. And that's also Dr. Manly's characterization. We have quite a bit of communication with Dr. Manly and he did refer to the effects of exports and full variables as unimportant relative to the changes or the trends in delta smelt that we have seen, especially recently.
Q. Dr. Miller, the question of what effects are important in terms of averting jeopardy to the smelt is, in significant part, a biological question; isn't that right?
A. At least in part, yes.
Q. It's an important part? It's a large part a biological question?
A. I suppose so, yes.
Q. And the question of what effects are important in terms of the avoiding adverse modification of critical habitat for the delta smelt, would you say that's also an important part a biological question?
A. Yes.
Q. And you're not a biologist, are you, Dr. Miller?
A. No. Could I explain, Your Honor?
THE COURT: Actually, I don't think that question and answer needs an explanation.
BY MS. KYLE:
Q. Dr. Miller, I'd like to turn back --

THE COURT: And I know what the explanation would be, if you were to give it. I don't think you need to. Thank you. Not being --

MS. KYLE: I'm sorry, I didn't mean to interrupt.

THE COURT: That's okay.

BY MS. KYLE:

Q. Dr. Miller, I'd like to return now to your analyses between the two zooplankton species in your testimony that you've discussed today and delta smelt abundance, if we could.

Dr. Miller, in your July 23rd declaration, I believe you set forth your opinion that it is food and not exports that is driving the abundance trends in the delta smelt today.

A. Yes.

Q. Is that correct? And does that remain your opinion, Dr. Miller?

A. It does.

Q. And you base that opinion -- I understand you've done a few analyses you presented today. But one of those you base your opinion on is a comparison of delta smelt abundance and the density of these two zooplankton species, Eurytemora and Pseudodiaptomus; is that correct?

A. Eurytemora and Pseudo --

Q. Eurytemora. I always put the emphasis on the wrong syllable.

And for this particular analysis, Dr. Miller, am I

correct that you used data only for the month of July?
A. Correct.
Q. You looked at a number of years, but the July data for those years?
A. That was the only -- we were looking in the summer and that was the only summer month where we had data for a long period of years.
Q. And Dr. Miller, what particular survey or source did you use for the abundance data for July?
A. We used the catch data from the Summer Townet Survey.
Q. Summer townet. And Dr. Miller, my understanding is that you created what I think you've referred to as a co-occurrence variable that combined information from July abundance, which you just said is summer townet data.
A. Right.
Q. And density of these two zooplankton species.
A. Yes.
Q. Around that time; is that correct?
A. Yes.
Q. Dr. Miller, what source did you use for your zooplankton density data for July?
A. I used -- we used the monthly zooplankton survey that's been conducted by the Department of Fish & Game for years and years.
Q. Is that a different survey from the Summer Townet Survey?

A. It is.
Q. Dr. Miller, the 20 millimeter survey is also conducted in July; correct?
A. Sometimes, yes.
Q. This year it was.
A. I think so, but I'm not sure.
Q. It's okay. Let me -- I think I can represent to you that it was. It's not important to what I want to ask you. My understanding, Dr. Miller, is that the 20 millimeter survey surveys for smelt and also for zooplankton; is that correct?
A. That's correct. In fact, that's what we used for the spring co-occurrence analysis.
Q. But not for the summer co-occurrence analysis?
A. Not for the summer analysis, no.
Q. So for the summer analysis, the July analysis, you used two different data sources. You used a different data source for the smelt abundance, that was the summer townet, and the monthly survey zooplankton.
A. That's correct.
Q. And you didn't use the 20 millimeter survey which provides information on samples from the same time, or I should say --
A. I understand what you're driving at. Yes, that's exactly what we did. And the reason we did that is we wanted a long period of record. And the Summer Townet Survey -- I'm sorry, the 20 millimeter survey only started in '95. When we got to

the spring, though, we did use the Summer Townet Survey for that analysis.

Q. Dr. Miller, in the analysis we've just been discussing, and I realize you presented it in your July 23rd declaration and again today that there may have been some changes. But in both cases, you looked at July data for the years 1981 through 2005; is that correct?

A. Well, we looked -- we focused on '81. That is most of our analyses were on that period. The ones I presented on the graph and my testimony were from that period. But we also extended the analysis back to 1972 and we extended the analysis forward, that is we used more recent periods than '81 through 2005. To see -- to make sure that the relationship held in more recent years.

Q. I remember that testimony. But just to clarify, the table you presented in your slide show today and here, I'm referring to the slide at page 26. This is, again, San Luis Exhibit C.

A. Yes.

Q. That shows the range 1981 to 2005; is that correct?

A. Right.

Q. And you didn't present these other charts you've been discussing that show the longer periods; is that correct?

A. Correct.

Q. Dr. Miller, I believe you testified -- and please correct me if I'm wrong -- but that the second zooplankton, the

Pseudodiaptomus, that doesn't show up on the data until 1986; is that correct?
A. Well, it doesn't show up in the data. They didn't start sampling for it in until 1989. But it's thought to have been introduced in 1986. So there were a few years there where it was in the estuary, but was not being sampled.
Q. So for the first roughly eight years represented in this chart, you don't have data for one of the two zooplankton species; is that correct? The Pseudodiaptomus, I believe you just said there's no data --
A. Correct. Because in those years the Pseudodiaptomus density was zero because they weren't in this estuary then. But we did have -- we did have data for Eurytemora. And what we were -- yes, that's the answer to the question.
Q. Dr. Miller, Eurytemora and Pseudodiaptomus aren't the only zooplankton species that smelt have been known to eat; is that correct?
A. Correct.
Q. For example, they may also eat a species called Limno --
A. Limnoithona.
Q. Tetraspina.
A. They do.
Q. And the analysis in your slides here and also your July declaration looked at only data for Eurytemora and Pseudodiaptomus; is that correct?

A. That's correct.
Q. Dr. Miller, I believe you --
A. Maybe that deserves some explanation as to why we might not have used density data for limnoithona. I don't think so.
THE COURT: Actually, Dr. Miller, I smiled at you. But you reached the right conclusion.
THE REPORTER: You could spell it, though.
THE COURT: Can you spell it for us?
THE WITNESS: L-I-M-N-O-I-T-H-O-N-A.
THE REPORTER: Thank you.
BY MS. KYLE:
Q. Dr. Miller, I believe you testified today -- and I may not have the words exactly right, but something to the effect that there is a major change in the food web in the Delta, the food web for smelt around 1986; is that right?
A. Yes. Yes, that's correct.
Q. And Dr. Miller, I'd like to turn back, if we could, to Plaintiffs' 5. This is the Feyrer article I was reading from earlier.
A. I have it.
Q. Could I turn you -- refer you to page 727 again.
A. Yes.
Q. And have you look in the right hand column, the first full paragraph there.
A. The one beginning "We separated the time series"?

Q. Yes. That's correct.
A. Yes. I see that.
Q. I'd just like to read this and have you follow along, if I could. "We separated the time series into two segments for this analysis: 1968 to 1986 and 1987 to 2004. This separation delineates a major ecological change in the food web of the estuary stemming from the invasion of the clam Corbula" -- my copy is not very good?
A. "Amurensis."
Q. Thank you. "Intense filtering of the water column by large populations of this clam essentially eliminated phytoplankton blooms in the lower estuary and caused major declines in the abundance of most planktonic invertebrates, including copepods, which are the primary prey of delta smelt." And then there's some citations.

"Separation of the two time periods allowed us to examine the role of water quality when food was relatively abundant versus when it was not."

Did I read that correctly?
A. You did.
Q. Except I think I forgot the first citation number on that.

Dr. Miller, your charts presents -- and this is -- I'm sorry, going back to Exhibit C, slide 26 of your slide presentation.
A. Yes.

Q. It presents the data from 1981 to 2005 in a single graph; is that correct?
A. That's correct.
Q. So it does not present the data in two time periods. Split around 1986; is that correct?
A. No. That's not correct. Well, in terms of what the graph presents, that's correct. But --
Q. That was my question.
A. -- we also analyzed the same data for the periods set forth in the -- well, we didn't go back to '68 because the data only go back to '72. But we did do '72 through 2005. And we did '87 through 2005. So we basically picked up the changes -- the step changes that Feyrer & Associates refer to. In fact, as I said in my testimony, we did all possible combinations of years, of periods starting with '81 through 2005. Then '82, then '83 and so forth.
Q. But you haven't presented those other combinations in your slides?
A. No, I haven't.
Q. Dr. Miller, I would like to turn your attention back to your July 23rd declaration. This has been marked San Luis Delta-Mendota Water Authority Exhibit G, I believe. Do you have a copy of that, Dr. Miller?
A. I don't think I do.
Q. I think we have an extra.

Your Honor, I have another copy if that's convenient. I know we have a large stack up there.

THE COURT: Yes, you may.

THE WITNESS: Thank you.

BY MS. KYLE:

Q. Dr. Miller, do you recognize the document I just handed you?

A. Yes, I do.

Q. It's your July 23rd declaration in this case; is that correct?

A. Yes.

Q. So this is the same document that's been marked as San Luis Delta-Mendota Water Authority Exhibit G; is that correct?

A. I don't have that on --

Q. That's not on -- but it is your July 23rd declaration in this case; correct?

Dr. Miller, please turn to Exhibit 4 of this declaration. It should be page 14 of 24.

Actually, I apologize. I guess the exhibits are not stamped on the copy that I have, the exhibit copy. But it's Exhibit 4 to your declaration.

A. Yes. 14 of 24, it's three graphs.

Q. Yes, that's correct.

A. Yes.

Q. So I just want to make sure I understand these graphs

correctly. Starting with the top chart. The vertical axis shows percentage increase or decrease in the fall midwater trawl index from one year to the next. Is that correct?

A. That's right.

Q. And in terms of the range you represented there, you've shown from 100 percent decrease on the bottom of the axis to 100 -- to 200 percent increase on the top; is that correct?

A. Yes.

Q. And the horizontal axis, again, on this top chart, that shows years; is that correct?

A. Correct.

Q. Dr. Miller, turning to the middle chart and the vertical axis again, this again shows percent increase or decrease in percentage density of prey; is that correct?

A. Yes.

Q. And looking at the body of the chart, there's two lines there; is that right?

A. Yes.

Q. It's a little bit hard to distinguish on my exhibit unfortunately, but my understanding is the slightly darker line is the one that's -- in your key, the percentage change in July. And you say that's -- is that supposed to be Eurytemora?

A. That's short for Eurytemora. So it's April, late April Eurytemora.

Q. So the line that represents that percent change, that shows the percent change in the July data for those two species from year to year; is that correct? It's a percentage change in their density, excuse me.
A. Yes.
Q. And the horizontal axis on this middle chart again just shows the years; is that right?
A. Yes. Correct.
Q. Let's return to the top chart. I wanted to look at 2005. Just make sure I'm understanding this right. So this chart is entitled "annual percentage change in fall midwater trawls"; correct?
A. Correct.
Q. And if you take the line where -- where it's above the 2005 point and you follow back to the left vertical axis, it looks like it's -- the annual percentage change from 2004 to 2005 was somewhere between maybe 50 percent and maybe 100 percent; is that right?
A. Correct.
Q. Maybe 60 or 70 percent roughly?
A. Yes.
Q. So that would represent the percentage change in the fall midwater trawl index from 2004 to 2005; is that correct?
A. Right.
Q. And Dr. Miller, is that true that the fall midwater trawl

index dropped from 74 to 26 between those two years?
A. I believe so.
Q. That's roughly consistent with your percentage on this graph; correct?
A. I hope so. Yes.
Q. And I wanted to turn back to the middle chart and again look at the line for percentage change in the July density, the two species, Eurytemora and Pseudodiaptomus.
I believe, Dr. Miller, it's a little bit hard to see on this copy, at least my copy, but that the -- if you go to 2005 again, that variable is represented by the line is higher on the graph, higher on the vertical scale; is that correct?
A. Yes.
Q. So if we look at 2005 for that variable, again following the left axis, am I correct that the percent annual change in prey density for those two species between 2004 and 2005 was roughly -- well, between 150 percent and 200 percent; is that correct?
A. For July?
Q. For the percent change in July --
A. Yes.
Q. -- the variable --
A. Yes, between 150 and 200 percent. It would have been all Pseudodiaptomus in 2005.
Q. I'm sorry. I didn't hear that.

A. It would have been all Pseudodiaptomus in 2005 because there were no more Eurytemora in July after about 1990 or so.
Q. Okay. And that the change in Pseudodiaptomus then from July 2004 to 2005 expressed as a percentage change in density, it was 180 percent positive change; right?
A. Right.
Q. So just looking at 2004 to 2005, Dr. Miller, in the same year when the fall midwater index increased by over 50 percent as we discussed, maybe 60 to 70 percent, the food supply, as you defined it as a combination of these two zooplankton species, but in fact this year it was just one. Pseudodiaptomus; correct? That same year, Pseudodiaptomus density increased by about 180 percent; isn't that correct?
A. Pseudodiaptomus density in July, yes, correct.
Q. Dr. Miller, I told you I wanted to talk a bit more about your co-occurrence variable. And I believe you discussed this at slide 23 of Exhibit C. Your slide presentation.
A. Yes.
Q. This is where you say there are important and statistically significant relationships between -- the first dash says "spring and summer co-occurrence of delta smelt and their prey" and then the second dash, "subsequent spawning abundance."
I'm sorry, Dr. Miller, I didn't realize you don't have it in front of you.

A. I'm fine. I have it. Yes.
Q. And your conclusion, Dr. Miller, in your -- on that page, which is titled your expert opinion, is that food density is very important to subsequent delta smelt abundance; is that right?
A. Correct.
Q. And this co-occurrence measure we've been discussing, if I understand it correctly, it combines information about the density of these two zooplankton species, although depending on the year you may just have one or the other.
A. Yes. Usually have one or the other.
Q. So it combines information on the density of those two species with density on the July abundance of the delta smelt; is that correct?
A. Correct.
Q. And that abundance is measured by the Summer Townet Survey data; correct?
A. Yes.
Q. Dr. Miller, I believe you said you were here for at least part of the testimony of Dr. Swanson; is that correct?
A. Yes.
Q. And do you recall her testifying that smelt exhibit a phenomenon known as stock recruitment?
A. Yes.
Q. And recruitment, just generally, describes the strong

relationship between the number of adult smelt found in the fall midwater trawl index, for example, and the number of juvenile smelt found earlier in the year, for instance, in the Summer Townet Survey.

A. Correct.

Q. Dr. Miller, is that a relationship fairly strong in smelt?

A. It depends on what period you're talking about. For years, there was no statistically significant relationship between summer townet index and the fall midwater trawl. But with two recent years -- and I can't remember now whether it's 2004/2005, 2005/2006, I think it's the former. These points were -- were extreme points in a relationship. And they made the relationship go from statistically insignificant to statistically significant, just those two points did.

Q. So it's your opinion that, at least in recent years, there has been a strong stock recruitment relationship between smelt measured in the summer, in the abundance indices in the summer, and the smelt measured in abundance indices in the fall. Do I have that right?

A. I don't know. What I said was that if you took all the years of -- you tried to correlate the summer townet with the subsequent fall midwater trawl over all the years of data, that you didn't get a relationship until the years, I believe, 2004, 2005 came along. And those years were -- both indices were so low that those two points, which appears outliers in

the graph were sufficient to create a statistically significant relationship.

But the specific question you're asking me as to whether in recent years there is a strong stock recruitment relationship between the summer townet and the fall midwater trawl, I just don't know. I mean, I must have done that at some point, but I'm sorry, I can't remember.

Q. That's all right, Dr. Miller. I don't think it's important to what I wanted to ask you about. Let me just represent to you that it is Dr. Swanson's opinion that there is a stock recruitment relationship during this period between the summer surveys in the fall?

A. In recent years?

Q. In recent years.

A. All right.

Q. So for example, let's take 2004 to 2005, since you said it appears -- I believe you said that there has been a statistically significant relationship for at least those years between the summer abundance and the fall abundance; is that correct?

A. Is that your -- so I'm to assume that Dr. Swanson's correct when she says that there is in recent years a strong stock recruitment relationship between the summer and fall?

Q. Sure.

A. You're asking me to assume that?

Q. Uh-huh. I just want to make sure I understand its implications for your analysis here. Your co-occurrence variable for July we've been discussing, I believe you told me that that combined information on the density of food for the smelt in July --

A. That's right.

Q. -- and information on smelt abundance in July.

A. Correct.

Q. Is that correct? And then you've related that co-occurrence variable or looked at the relationship between that variable for a series of years and the fall index adult smelt?

A. Exactly.

Q. Is that correct?

A. Yes.

Q. Dr. Miller, assuming that Dr. Swanson is correct, that there is a strong stock recruitment relationship for smelt and that therefore you'd expect the July abundance of smelt to be somewhat predictive of the fall abundance.

A. Uh-huh.

Q. Wouldn't you expect that to affect your analysis?

A. Um --

Q. Let me rephrase.

A. Yes.

Q. How would you know if you combined these two pieces of

information into a single co-occurrence variable, that it's not the July abundance that's affecting the fall abundance rather than the food affecting the fall abundance?
A. In fact, I think that's the case. The -- we're not using -- we use the summer townet data to estimate the abundance of smelt in July. We're not using the summer townet index to estimate juvenile smelt abundance in July. We're using only the July data from the summer townet index to estimate what, for the purpose of our discussion, I would call the July abundance; as distinguished from the summer townet index, which is estimated by whatever method they use to estimate the summer townet index. We are -- we're talking about something that's slightly different. And that's what we used in our co-occurrence analysis.
Q. So you used -- you used a measure of July abundance of the delta smelt; is that correct?
A. It's based on the summer townet data, but it's not equivalent to summer townet index.
Q. I understand.
A. When we did that analysis, it was pointed out to us that in the period '97 through '05, there was a very strong relationship between July abundance of delta smelt and the subsequent fall midwater trawl without considering co-occurrence, which we attribute to the fact that the -- probably that the food densities had gotten so low,

were low and relatively level, that really the thing that most made the difference was what the smelt abundance was in July. That was not true before 1997 for any of the years before 1997.

But for '97 on, that was the case. And that is the fact that turned out to be an important discovery for us because that's what makes the spring co-occurrence work so well.

The spring co-occurrence for the period '97 through '05 is essentially a life cycle model for delta smelt. And the reason for it -- maybe this is much more than you wanted me to respond to, but the reason for it is because that in July, in the period '97 through '05, fall midwater trawl has a very strong relationship with our estimate of July abundance without considering co-occurrence.

Q. So Dr. Miller, I believe part of what you just told me is that, at least around '97 and onwards, it's your opinion that there may, in fact, be a statistically significant relationship between this July abundance data --

A. Yes.

Q. -- and the September abundance data; is that correct?

A. Yes.

Q. I should say fall abundance data. I apologize.

A. Yes.

Q. And you combined information on July abundance with

information on zooplankton density in July to create the co-occurrence variable; correct?

A. Right. Although in that period that you've identified, '97 to '05, it's not necessary to do that combination. You can predict the fall midwater trawl from the July abundance alone.

However, I have to add, the thing that controls July abundance and the cause of the good relationship between July abundance and fall midwater trawl also controls the fall midwater trawl is the late April co-occurrence of juvenile --

Q. That's the spring --

A. Yes. Spring co-occurrence.

Q. Dr. Miller, I understand that you presented both analyses here in your testimony today. I'd like to refer you back to your July declaration in this case. It's my understanding, correct me if I'm wrong, but your July declaration presents just the analysis for the summer, the co-occurrence analysis based on the July data; is that correct?

A. I don't have the July declaration in front of me. Oh, wait, I'm sorry.

Q. I'd be happy to --

A. I do have that. You've already given it to me.

Q. This is your July 23rd declaration. It's document 407 in the case. It's Exhibit G. And my understanding is based on the paragraph five in particular.

A. No. In fact, I present both the analyses, both the July -- the graphs are on page 10 of 24 and the spring co-occurrence, the graphs presented on page 12 of 24.
Q. Oh, okay. So it's this -- it's a different shape of graph, is that correct, Dr. Miller?
A. Yes, it is, because there are -- as I said in my testimony, there are two independent variables in that correlation. Whereas with the summer townet -- I mean, the July co-occurrence, there's only one independent variable, which is mainly the estimate of co-occurrence.

In the spring relationship, because of the way we measure abundance, we measured abundance with the fall -- previous fall midwater trawl because we weren't -- while we were reasonably confident we could estimate the distribution of smelt in late April from the 20-millimeter data, we weren't confident that we could estimate the population relative to the confidence we had in the population estimate from the previous fall midwater trawl.

THE COURT: Ms. Kyle, at this time I'm going to exercise my discretion under the Federal Rule of Evidence 611 and ask you to complete your questioning within about ten minutes. Since I'm both the trier of fact and law in this proceeding.

MS. KYLE: Thank you, Your Honor. I can do that.
Q. Dr. Miller, I believe you discussed that you posted some

of the analyses you discussed today online; is that correct?
A. That have been posted, yes.
Q. And you've presented them in some forum?
A. Yes.
Q. And you haven't received -- withdraw that question.
What I was curious about, Dr. Miller, is whether you've ever submitted a version of the work you presented here today to a peer review journal for publication? Have you?
A. We have. We're in the process. We're in that peer review process now.
Q. Have you submitted the work you presented here today, or an earlier version of that work, for peer review before?
A. Before?
Q. Before this current process.
A. No.
Q. You have not?
A. No.
Q. Dr. Miller, in your August 13th declaration, it's your most recent declaration in this case, didn't you criticize Dr. Swanson for basically her expert opinions on some work of Dr. Bennett's? This is the Big Mama work.
A. Yes.
Q. Because it hasn't yet been published in a peer review journal; is that correct?
A. Correct.

Q. And I believe you said in your declaration that without access to any written information on this theory, it's difficult to be certain exactly what it consists of; is that correct?
A. Yes. But the difference in this case between Dr. Bennett and what we've done is we've posted ours and presented it. We've made it available. If you email us, we'll send it to you. That's not the case with Dr. Bennett. You can't -- you simply can't get your hands on it.
Q. You've seen the theory presented; is that correct?
A. I've seen --
Q. Dr. Bennett's theory. You've seen it presented?
A. I have seen it. I can't say I followed it all. I've actually met with him. I still can't quite say I follow it all.
Q. Thank you.
A. I'm not saying it's wrong. I'm just saying I can't follow it all.
MS. KYLE: Your Honor, may I have a moment to consult with co-counsel?
THE COURT: Yes, you may.
MS. KYLE: I have no further questions at this time, Your Honor.
THE COURT: Thank you.
Mr. Maysonett, do you have any questions?

MR. MAYSONETT: I do not, Your Honor.
THE COURT: Mr. Lee, do you have any questions?
MR. LEE: We have no questions.
THE COURT: Mr. Wilkinson, any questions?
MR. WILKINSON: No, Your Honor.
THE COURT: Any redirect?
MR. O'HANLON: Very brief, Your Honor.

REDIRECT EXAMINATION

BY MR. O'HANLON:

Q. Dr. Miller, the white paper that was discussed at the outset of the cross-examination, that included a population viability analysis; correct?

A. It did.

Q. And the peer reviewers comments related to that analysis; correct?

A. Yes. Well, up to all of the analyses and that was one of them.

Q. And did the white paper include a population estimate?

A. It did.

Q. All right. And the peer reviewer's comments related to that analysis?

A. Yes.

Q. And are you relying on any of those analyses for your opinions today?

A. No.

Q. Did the peer reviewers review any of the analyses you presented today concerning the impact of project operations on delta smelt?
A. In that process, no, they didn't.
Q. Did the peer reviewers review your analysis of the limitation in the spring and the summer?
A. No.
Q. One last question. In your food analysis, why did you not use the data for zooplankton other than Eurytemora and Pseudodiaptomus?
A. We had talked to the biologist, we reviewed the literature and what we -- and we also looked at data on what was being found in the guts of delta smelt. And the opinion of the biologist were that -- was that those were the two predominant species.

MR. O'HANLON: Thank you, Your Honor. I have nothing further.

THE COURT: Any recross?

MS. KYLE: No, Your Honor.

THE COURT: May this witness be excused?

Thank you, Dr. Miller. You may step down. You are excused.

All right. Anything further, Mr. O'Hanlon?

MR. O'HANLON: No, Your Honor.

THE COURT: All right. Mr. Lee? Or are we at a

point where we can't call him because he isn't here?

MS. WORDHAM: That's correct, Your Honor.

THE COURT: Ms. Wordham. All right. We could take out of order, if you have any rebuttal that you'd like to present, since we have half an hour, let's do it.

MR. WALL: Your Honor, we're not prepared to do that today. If we could reserve it for tomorrow, I promise to keep it quite short.

THE COURT: Yes. We can do that. All right. Is there anything further that we can accomplish today?

MR. WILKINSON: Your Honor, another -- go ahead.

MS. POOLE: I imagine we're about to raise the same thing. I was going to suggest that we wrap up the declaration discussion that we began this morning.

THE COURT: Yes. That seems like it would be appropriate.

MS. POOLE: Why don't I begin, Your Honor. I'm concerned about the continually spiral of declarations that are being sought to be entered in response to each other's submissions. So what I'd like to suggest -- this morning I suggested that we would like to introduce Mr. Gleick's -- Dr. Gleick's declaration. And if I understood correctly, I believe the State Water Contractors wanted to introduce Arakawa and DWR wanted to introduce Alemi in response to that.

MR. WILKINSON: We also have two declarations we

described yesterday. The declaration of Jill Duerig and the declaration of Joan Maher. We have copies of those and they are redacted. We have a copy of Mr. Arakawa's declaration that's redacted and we're hoping to receive copies of Mr. Gleick's and Mr. Rosekrans and Mr. Hanneman.

MS. POOLE: Yes. What I was going to suggest was that we would be willing to withdraw the submission of Dr. Gleick's declaration if we can also dispense with Alemi and Arakawa. Give the Judge less to read.

MR. WILKINSON: I'm sorry. Dispense with whom?

THE COURT: Dr. Gleick. They are offering to withdraw Dr. Gleick's declaration if that will dispense with Arakawa and -- I'm saying it Alemi, that's phonetic, I may not --

MR. WILKINSON: Not sure who Alemi.

MR. LEE: Dr. -- Dr. Alemi is the DWR specialist on water conservation for whom we've submitted document 431. We would be willing to withdraw our submittal of Dr. Alemi's declaration document 431 if the plaintiffs are not going to be submitting the declaration of Dr. Gleick.

MR. WILKINSON: Would your proposal also include the withdrawal of Dr. Hanneman's declaration?

MS. POOLE: If that also includes the withdrawal of Dr. McKusick.

MR. WILKINSON: We didn't submit Dr. McKusick.

MS. POOLE: I understand that.

MR. WILKINSON: So that one can definitely be withdrawn.

MR. O'HANLON: Yes, Your Honor. I had raised the possibility of introducing Dr. McKusick's declaration in response to Dr. Hanneman's declaration. So if Dr. Hanneman's declarations is withdrawn, then we can forget Dr. McKusick's declaration.

THE COURT: Remember it's after 4:30 for the reporter.

MS. POOLE: All right. Well, Your Honor, I think where that leaves us is that plaintiffs would like to mark as exhibits and introduce at this time Poole declaration.

THE COURT: That's Exhibit 22.

MS. POOLE: Yes, that's correct.

MR. WALL: I think it might be 22, Your Honor.

THE CLERK: 22 was never marked. She mentioned it and it --

THE COURT: Then it's Exhibit 23 for identification.

(Plaintiffs' Exhibit 23 was marked for identification.)

THE COURT: And subject to your -- this seems to be foundational. So is there any reason not to have it in evidence?

MS. McDONALD: Your Honor, Defendant Intervenors

Glenn-Colusa Irrigation District is going to object to the introduction of the Poole declaration dated July 23rd, 2007 on the grounds of relevance as to the exhibits.

MS. POOLE: Your Honor, this is a -- as I explained earlier, merely an authentication document with several government documents attached and those government publications go, among other things, to public health and safety definitions from the California Water Code and the Bureau of Reclamation. So we believe it is relevant to this matter.

THE COURT: Why can't I take judicial notice of it if they're official publications? And if you've provided them.

MS. POOLE: If you'd prefer to do it that way, Your Honor, we could do it that way.

THE COURT: It seems to me that there is no question that public health and safety is a major concern in this hearing and that if these provide legal definitions that are generally recognized by the agencies who are either action agencies or agencies of concern, seems to me that we would have to have the definitions. So they're certainly relevant, if that's the ground of your objection. That is overruled. Is there any other basis to keep them out?

MS. McDONALD: Your Honor, what I'm referring to is specifically attachments 4, 5, 6 and 7 to the Poole declaration. And these attachments refer to the contract

renewals which the Court addressed on Tuesday, August 21st, 2007. And I believe on that date the Court suggested that the contract renewals would not be subject to this interim proceeding. So those documents may have relevance in future proceedings.

For purposes of this limited interim remedy proceeding, we just want clarification that those documents are not introduced for purposes of addressing the contract renewal.

MS. POOLE: Your Honor, to the extent that the Court has decided to defer a ruling on our remedy request that's related to the long-term contract renewals, those exhibits that have been identified to go to that portion of the argument.

THE COURT: All right. It seems to me that would be the most efficient thing to do because we haven't had any evidence on contracts. That's a different subject. We just, quite frankly, got the amendment order out today to all of you. And so as of today, the complaint has now been amended effectively.

My sense of this is that let's not include these exhibits now at this phase and if you want to raise that subject with the Court, you can do it at a different time. And so --

MS. POOLE: That's fine, Your Honor.

THE COURT: Hopefully we could streamline this declaration then.

MS. POOLE: So to clarify the record, what we're admitting is Poole document -- Poole declaration, document 419 filed July 23rd with attachments 1 through 3.

THE COURT: One through 3. All right. I'm going to instruct the courtroom deputy to then take and separate the balance of the attachments so that those are no longer a part of Exhibit 23. And I'm going to admit Exhibit 23 into evidence.

(Plaintiffs' Exhibit 23 was received.)

MS. POOLE: Thank you, Your Honor.

MS. McDONALD: Thank you, Your Honor.

MS. POOLE: The remaining two declarations we have are the two declarations of Mr. Rosekrans. The declaration of Mr. Rosekrans dated July 23rd, 2007, document 420.

THE COURT: That would be Exhibit 24.

MS. POOLE: Be plaintiffs' 24.

(Plaintiffs' Exhibit 24 was marked for identification.)

MS. POOLE: I'd like to move that into evidence at this time.

THE COURT: Any objection?

MR. WILKINSON: No, Your Honor.

THE COURT: Exhibit 24 is received in evidence.

(Government's Exhibit 24 was received.)

MS. POOLE: And Plaintiffs' Exhibit 25 --

MR. LEE: Your Honor, we understood that the declarations were going to be submitted subject to written objections to be filed at a later date. Is that no longer to be the situation here?

THE COURT: I will give you, if you need more time, time to make objections. But a later date would be tomorrow.

MR. LEE: Is that the plaintiffs' understanding, that they were going to have any written objections --

MS. POOLE: That was my understanding. And so perhaps we could file written objections first thing in the morning before court resumes.

MR. LEE: Well, we would prefer the written objection to give us some time to have word processing access, which we do not have as of today. So we would prefer that to be promptly next week. Would that be possible?

THE COURT: Well, I have indicated to you that I want to make my decision tomorrow.

MR. LEE: I see.

THE COURT: You can file your objections next week.

MR. LEE: Well, this --

MS. POOLE: Perhaps Mr. Lee, we could do them orally.

THE COURT: What about making them orally?

MR. LEE: We'll look at the declarations, see if we

have oral objections. And if we do, we'll make them tomorrow morning.

THE COURT: All right. That seems to me to be prudent.

MS. POOLE: And finally, Your Honor, we have Plaintiffs' Exhibit 25, the declaration of Mr. Rosekrans dated August 13th, 2007. That's document 466-3. I'd like to move that into evidence at this time.

(Plaintiffs' Exhibit 25 was marked for identification.)

THE COURT: All right. I'm going to -- any objection to Exhibit 25? I'm reserving the State DWR's right to object to these documents. However, for now, I'm going to provisionally, unless there's other objections, admit 25. Wit.

MR. WILKINSON: We do have some concerns, Your Honor, about Exhibit 4 to the Rosekrans declaration. I believe that's 25.

THE COURT: What is Exhibit 4?

MR. WILKINSON: It is apparently a document produced by environmental defense recently developed water storage capacity in California. Appears to be hearsay. It's not Mr. Rosekrans' document, as far as I can tell.

MS. POOLE: I believe it is Mr. Rosekrans.

MR. WILKINSON: Exhibit 5, excuse me. I'm sorry.

And also Exhibit 5 is another Environmental Defense document that is called "Finding the Water." It appears Mr. Rosekrans was an author of that, but it's certainly hearsay as to is -- with respect to his declaration.

MS. POOLE: Your Honor, Mr. Rosekrans authored or co-authored both of those documents, which I believe is authenticated in his declaration. I'm looking for it now.

THE COURT: All right. I'm looking at Exhibit 25 and it contains the following. My copy of this contains the following: Exhibit SR Supplemental 1a. Exhibit SR Supplemental 1b, Exhibit SR Supplemental 1c and then Exhibit SR Supplemental 2. There are no other exhibits attached to what I have marked as Exhibit 25, which is the declaration of Spreck Rosekrans and it is dated 13 August, 2007.

MR. WILKINSON: Your Honor, I think --

MS. POOLE: Mr. Wilkinson is referring to Plaintiffs' Exhibit 24.

MR. WILKINSON: I may have gotten the numbers crossed, Your Honor. We've got a lot of papers.

THE COURT: All right. Bear with me and I will try to find exhibit number --

MR. WILKINSON: My objections go to the -- what appear to be the exhibits to Plaintiffs' 24, Your Honor. Could we --

THE COURT: Let me, if I could, tell you that we

appear to have two copies -- let me take that back.

MS. POOLE: Your Honor, perhaps --

THE COURT: Although the facing page of what is marked as 24 that was handed to the courtroom deputy, the facing page is document 466-3. However, what appears to follow it is identical to Exhibit 25, including the Exhibits. So there is no Exhibit 4 or 5 to 24. So it does not appear that we have the right Exhibit 24. So I'm going to hand this back to the courtroom deputy. And we will see if we have the wrong or the right Exhibit 24.

All right. The Exhibit 24 that I'm now holding has an Exhibit 4, which is titled "Recently Developed Water Storage Capacity in California April of 2007" by Environmental Defense.

MS. POOLE: Exhibit 5, Your Honor, begins at -- oh, I guess it's page one of 32 of document 420-3.

THE COURT: I have document 420-3, Exhibit 5, which is one of 32 pages.

MS. POOLE: Yes. And Your Honor, if you turn to page three of that document 420-3.

THE COURT: Yes.

MS. POOLE: You'll see that --

THE COURT: Mr. Rosekrans.

MS. POOLE: One of two authors listed there is Mr. Rosekrans.

THE COURT: Yes.

MS. POOLE: And for Exhibit 4, Mr. Rosekrans did co-author that document. I can't find offhand if he provides that in here. But in any case, he certainly relies on it as part of his analysis.

THE COURT: Well then why don't I admit 24 with all its exhibits, but I will permit the defendants, if they wish, to cross-examine Mr. Rosekrans about any data that they have any issue with that is in Exhibits 4 or 5.

I will be very candid. My chances of reading all those exhibits this evening before 8:30 a.m. tomorrow morning, I'm going to be reading a lot tonight, but I don't know if I'm going to get through every one of these exhibits. And so I would expect that if there are page references to particular data that Mr. Rosekrans is referring to, that's all I'm going to look at. I'm not going to read the whole exhibit unless there's a reference to it.

And that is under the principle that the Court has no duty to search the record, to look for anything that is unreferenced and uncited to. If you don't have a pin cite to something and just dump in hundreds of pages of documents or exhibits in the record. I can't read hundreds of pages of exhibits when I haven't been pinpointed to exactly what you want me to.

MR. WILKINSON: Your Honor, in light of that, we're

certainly not trying to make this process which is already difficult, more difficult than is already necessary. In light of that, we'll withdraw the objection to those exhibits.

THE COURT: Thank you. And does Mr. Rosekrans' declaration refer to -- because I'm going to focus on his declaration, to whatever underlies it in the exhibit specifically?

MS. POOLE: Yes, it does, Your Honor.

THE COURT: All right. Then that will take care of that.

MS. POOLE: Yes. Thank you, Your Honor.

THE COURT: All right. Now, Mr. Maysonett, do you have any exhibits that you want to submit?

MR. MAYSONETT: Not at this time, Your Honor. I've already submitted the declarations of Mr. Milligan and the plaintiffs have submitted their written objections.

THE COURT: Thank you. Mr. Lee?

MR. LEE: Oh, Your Honor, among all the declarations we've been talking about today, there are apparently two which the plaintiffs have chosen not to object to and those are the Department of Water Resources redacted declarations of Jerry Johns. We have made copies of the two declarations.

They are the declaration of Jerry Johns in support of California Department of Water Resources Interim Remedy Proposal filed July 9th, 2007 with redactions. And there are

also the August 3rd, 2007 declaration of Jerry Johns, supplemental declaration of Jerry Johns.

The first declaration was document No. 399 and the second declaration is document 432. We understood from this morning's conversation that plaintiffs have no objection.

THE COURT: All right. Let you mark, then, what is the next DWR exhibit number?

THE CLERK: G.

THE COURT: G will be the July 9th, '07 declaration, document No. 399. That is DWR Exhibit G received in evidence.

(Defendant's Exhibit DWR G was received.)

THE COURT: And Exhibit H. DWR H will be the August 3rd, 2007 declaration of Mr. Johns, document No. 432. And I will ask that those be provided to the courtroom deputy.

(Defendant's Exhibit DWR H was received.)

THE COURT: All right. Mr. Wilkinson.

MR. WILKINSON: Yes, Your Honor. Thank you. There were three declarations, Your Honor, that we wanted to move. The first of those was the declaration of David Fullerton, which actually came in yesterday. It was State Water Contractors Exhibit Q.

THE COURT: Bear with me.

MR. WILKINSON: For the record, the --

THE COURT: No, I said bear with me, please. I'm looking for something.

All right. You can go ahead. So the first of these is --

MR. WILKINSON: The first of these -- this would be, I believe, State Water Contractors Exhibit W. It is the declaration of G.F. Duerig. D-U-E-R-I-G.

THE COURT: I don't believe I have that up here.

MR. WILKINSON: I don't believe you do.

THE COURT: You need to give it to the courtroom deputy so it can be marked.

MR. WILKINSON: That is docket number 451. And it was filed on August 13. Ms. Duerig is the general manager the Alameda County flood control and water conservation district zone 7.

(Defendants' Exhibit SWC W was marked for identification.)

THE COURT: All right. Any objection to this declaration?

MS. POOLE: We will have objections filed first thing in the morning, Your Honor.

THE COURT: All right. Thank you.

MR. WILKINSON: And the second declaration we would offer today, Your Honor, is the declaration of Joan Maher. Ms. Maher is a water manager at the Santa Clara Valley Water District. It is docket number 455 also filed on August 13th of this year.

THE COURT: That will be marked SWC X.

(Defendant's Exhibit SWC X was marked for identification.)

THE COURT: Any objection to this document?

MS. POOLE: Yes. We will file objections to this document, Your Honor.

THE COURT: All right.

MS. POOLE: Your Honor, just to clarify. I believe the declaration of David Fullerton, which was marked SWC Exhibit Q yesterday was moved subject to our objections.

THE COURT: Yes. And I ruled on your objections at the time. I'm going to find that now. This -- what I have is obviously unredacted. It has a voluminous exhibit attached to it. The declaration itself appears to be ten pages. But then there is probably an additional 75 pages.

MS. POOLE: And Your Honor, it was simply the two attachments which we had objected to.

THE COURT: Right. And I said I wouldn't receive those for the truth, only as they are referred to specifically to explain or support any opinion that is expressed and for no other purpose. So that was my ruling on those exhibits.

And again, so that you know, I'm not going to look at the exhibit unless there's a page and line reference in it to something that is offered as support for the opinion that is given.

MR. WILKINSON: I think the situation there, Your Honor, is essentially identical with the situation concerning Mr. Rosekrans. There are attachments that are referred to in the declarations and we --

THE COURT: So for completeness, they're attached.

MR. WILKINSON: Correct.

THE COURT: But unless there's a specific reference to a page and line, I'm not going to read it.

MR. WILKINSON: Understood.

THE COURT: All right. Any other documents from the State Water Contractors?

MR. WILKINSON: No, Your Honor. The only question we have is whether the plaintiffs intend to cross-examine Mr. Fullerton.

MS. POOLE: No. It was my understanding that none of these witnesses would be cross-examined.

MR. WILKINSON: All right. I appreciate that. Thank you. We have nothing else to add to the record, Your Honor.

THE COURT: Thank you. Mr. O'Hanlon.

MR. O'HANLON: Yes, Your Honor. As I indicated yesterday, we have five declarations by a total of four declarants that we have redacted in light of the Court's instructions and I have provided copies to plaintiffs' counsel.

My intention, as I said yesterday, was to offer those

in evidence today and make those witnesses available for cross-examination. I discussed it with plaintiffs' counsel. They're willing to allow the declarations in subject to their written objections. My intention would be to offer those redacted declarations to the Court tomorrow morning.

THE COURT: All right. You don't have them?

MR. O'HANLON: I apologize, Your Honor, I didn't bring them today.

THE COURT: Yes. All right. Well, that's understood.

All right. Does that then complete any declarations that any party wishes to submit?

That's a yes?

MS. POOLE: That's a yes, thank you.

MR. WILKINSON: Yes, Your Honor.

MR. LEE: Yes, Your Honor.

MR. O'HANLON: Yes, Your Honor.

THE COURT: Now, let us talk about time estimates and what time the parties are going to need for their arguments. We have Mr. Leahigh to put on. It's about an hour or so on direct and we'll assume an equal time on cross.

MS. WORDHAM: I would say approximately an hour and a half to two hours. I'll tailor it as much as I can.

THE COURT: All right. That would be appreciated.

MR. LEE: Your Honor, we would like to make a

briefing opening statement.

THE COURT: Yes, and you will.

MR. LEE: And then to be followed up by the direct examination.

THE COURT: All right. Well, I am, again, eternally optimistic, and so I'm going to assume that we will be -- we're going to start at 8:30. We should be able to close the evidence by 11:30. Then we're going to have 45 minutes left in the morning session and we will have three and a half hours in the afternoon session.

Relative to arguments, you can expect that I'm going to be talking to you during your arguments and asking questions. And so you better leave time for me at the end to announce the decision. And I'm going to guesstimate that that should be not less than 30 minutes. So now we'll take the rest of the time and let's divide it. So what's the plaintiffs estimate?

MR. WALL: Estimate for argument, Your Honor?

THE COURT: Yes.

MR. WALL: I think that would depend a lot on how much time is available. There's been a lot of evidence we could go through and, you know, I think I would structure it around what is available to us.

THE COURT: We have four hours, as I calculate it. A half an hour of which I'm going to take. And so that gives us

three and one-half hours to divide among the parties. And because you're, in effect, the moving party, you get a reply.

MR. WALL: I'd like to suggest that realistically we might want to leave a half hour buffer there for unexpected contingencies and that would leave three hours.

THE COURT: All right.

MR. WALL: And -- oh, I'm sorry, Your Honor, we were going to have a brief rebuttal by Dr. Swanson.

THE COURT: Yes.

MR. WALL: My guess is it would be about 15, 20 minutes.

THE COURT: All right. I'm hoping that optimistically that we'll be able to get that done by 11:30 along with Mr. Leahigh.

MR. WALL: Right. You know, from our perspective, we'd love to split this time half and half with the defendants, but the Court has, with the witnesses, split it one-third, one-third and one-third and I think we could live with that.

THE COURT: All right. Mr. Maysonett?

MR. MAYSONETT: Your Honor, I would expect that the federal defendants would like, if possible, to have between half an hour and 45 minutes for argument tomorrow.

THE COURT: Mr. Lee?

MR. LEE: Your Honor, I think we can do close in a

half an hour.

THE COURT: Thank you. Mr. Wilkinson.

MR. WILKINSON: Your Honor, I think there are three of us who would close and I think we would share an hour. So it would be about 20 minutes roughly each.

THE COURT: All right. Makes sense. All right. That's the way we're going to divide the time then. We're going to allocate an hour to the plaintiffs and they can divide that between their opening argument and their reply in any manner they see fit.

We're going to give the federal defendants 30 minutes for sure and it depends on how urgent you think it is, Mr. Maysonett, if there's need for any more time. 30 minutes to DWR. And then one hour to the three intervenor defendants to divide as they see fit.

MR. BUCKLEY: That would be fine.

MR. O'HANLON: Thank you, Your Honor.

THE COURT: 30 minutes for the Court. And 30 minutes for contingency, although when we get there we may not have it.

All right. Is there anything further we can accomplish before we recess?

MR. BUCKLEY: Your Honor.

THE COURT: Yes.

MR. BUCKLEY: I have one other point that may be of

interest to others in the courtroom. Your Honor issued an order today granting the plaintiffs leave to file their supplemental complaint. I haven't read it yet, probably most of us haven't had a chance to yet, but my understanding is that there's no mention in the order of how long we would have to respond to the complaint.

THE COURT: There is not.

MR. BUCKLEY: And I think therefore the federal rules would govern and if I remember --

THE COURT: It would be ten days if I didn't extend the time.

MR. BUCKLEY: Yes, Your Honor. And that, I guess, gets to the question I wanted to ask Your Honor, which is whether it would be possible to have somewhat more time than ten days to respond to the supplemental complaint. I haven't had a chance to poll the two sovereigns in the defendant intervenors to see what would be suitable for them, but it did seem to me that under the circumstances ten days might not be quite enough.

THE COURT: All right. What time do you request?

MR. BUCKLEY: From the intervenors' standpoint, Your Honor, 20 days would suffice.

THE COURT: All right. Mr. Maysonett?

MR. MAYSONETT: Your Honor, I would tend to agree that we're likely to be caught up in matters still related to

the Court's order and 10 days would be very difficult to meet. I would probably ask for 30 days.

THE COURT: Mr. Lee?

MR. LEE: Your Honor, unfortunately, as this trial wraps up, I am like leaving for vacation and I would appreciate 45 days. That would allow me to be at least back when the responsive pleading, including the 12(b) pleadings might be appropriate.

THE COURT: All right. Let me ask the plaintiffs. What's your view about response time to the defendants?

MS. POOLE: I'm sorry, Your Honor, may we have just a moment?

THE COURT: Yes, you may.

MS. POOLE: Your Honor, we certainly don't have any wish to force the other parties to do this quickly, but we do have a concern. I'm not sure how big a concern it is at this point, that -- about the effectiveness of Your Honor's remedy order before the supplemental complaint is answered. And I wouldn't want to agree to anything at this moment that might cause a problem there. So we could be prepared to better address this tomorrow, I think.

THE COURT: All right. We can do that.

MS. POOLE: Thank you.

THE COURT: But don't let it fall through the cracks.

MS. POOLE: No, sir.

THE COURT: Is there anything else we can accomplish this evening?

We will stand in recess until 8:30 a.m.

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