BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA WATERFIX WATER RIGHT CHANGE PETITION HEARING	)))

JOE SERNA, JR. BUILDING

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

BYRON SHER AUDITORIUM

1001 I STREET

SECOND FLOOR

SACRAMENTO CALIFORNIA

PART 1A

Friday, August 26, 2016

9:00 A.M.

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APPEARANCES:

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present

Tam Doduc, Co-Hearing Officer:
Felicia Marcus, Chair and Co-Hearing Officer:
Dorene D'Adamo, Board Member

Staff Present

Diane Riddle, Environmental Program Manager
Dana Heinrich, Senior Staff Attorney (a.m.)
Samantha Olson, Senior Staff Attorney (p.m.)
Kyle Ochenduzsko, Senior Water Resources Control Engr.

For California Department of Water Resources

James (Tripp) Mizell, Senior Attorney

Duane Morris, LLP
By: Thomas Martin Berliner, Attorney at Law

U.S. Department of the Interior, Bureau Reclamation,
and Fish and Wildlife Service
Amy Aufdemberge, Assistant Regional Solicitor

State Water Contractors

Stefanie Morris
Adam Kear
Becky Sheehan

(Continued)

APPEARANCES (continued)

Deirdre DesJardins
Deirdre DesJardins

Pacific Coast Federation of Fishermen's Associations
and Institute for Fisheries Resources
Ben Eichenberg

Planetary Solutionaries
Patrick Porgans

Snugg Harbor Resorts LLC
Nikki Suard

Save the California Delta Alliance, et al.
Michael Brodsky

I N D E X

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EXHIBITS

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Friday, August 26, 2016 9:00 a.m.

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P R O C E E D I N G S

CO-HEARING OFFICER DODUC: Good morning, everyone. It is 9:00 o'clock. Welcome back to the WaterFix Petition Hearing.

Again, for the record, I'm Tam Doduc. Up here are Chair Felicia Marcus, Diane Riddle, Board Member DeeDee D'Adamo. To my left, Dana Heinrich and Kyle Ochenduszko.

We also have Jean McCue and Kevin Long assisting us today.

As usual, if an alarm sounds, we are leaving. Your choices are either go down the stairs or go into a protective vestibule. We will exit and meet up in the park.

Always use the microphone when providing your comments and start by stating your name and affiliation.

The court reporter is here.

Thank you for coming back and not running away in terror.

And as always, unless you want to be on the receiving end of my death glare, please put your noise-making devices to silent, vibrate, sleep, off if

necessary. Please take a moment, do it now.

All right. So unless there's any other procedural matters? Looking at the hearing team -- no. All right.

We will resume with cross-examination by Ms. DesJardins.

And by my estimate, you are now on to your second point, right?

MS. DES JARDINS: Yes.

ERIK REYES, ARMIN MUNEVAR,
GWEN BUCHHOLZ, KRISTIN WHITE,
PARVIZ NADER-TEHRANI,
TARA SMITH, JAMIE ANDERSON,
MICHAEL BRYAN,

called as witnesses by the Petitioner, having been previously duly sworn, were examined and testified further as hereinafter set forth:

CROSS-EXAMINATION BY MS. DES JARDINS (resumed)

MS. DES JARDINS: So I wanted to ask you -- can you please bring up Exhibit 41 on the CalSim modeler questions, CalSim folder?

MR. LONG: Did you say DWR-41?

MS. DES JARDINS: DDJ-41. Yeah, the modeler questions, CalSim, 41.

(DeJardins Exhibit DDJ-41 identified for the record)

MS. DES JARDINS: So I've just -- this is the State Water Project Delivery Reliability Report. I provided the whole report. The reason it's relevant is that there's a statement about the validation and calibration status of CalSim.

DWR, you do recognize this document?

WITNESS REYES: Yes, I recognize it.

MS. DES JARDINS: Okay. Let's put it away. I've got Exhibit 42. I've got the relevant excerpt.

(DesJardins DDJ-42 identified for the record)

MS. DES JARDINS: This is from -- the Appendix G has comment letters. Let's read it down. This is from Planning and Conservation League. And they say:

"The lack of calibration and other deficiencies of CalSim II have made known to DWR in formal comments on the 2002 Draft by several parties, specifically Arve Sjovold and Dennis O'Connor. In addition, a 2003 expert peer review report documented numerous problems in CalSim II and concluded that its predictions should be treated as hypotheses. Some of these previously highlighted deficiencies are listed below.

"CalSim II has not been calibrated or validated. It's unclear whether CalSim II incorporates limitations to groundwater use in the Sac Valley. CalSim II does not recognize or report uncertainty. Additionally, CalSim II may" not produce -- "may produce results not consistent with reality. For example, in 2001, California experienced water supply associated with approximately the 75 percent exceedance level. And the State Water Project was able to deliver 1,607,570 acre-feet. However, the CalSim II simulation predicted a 75 exceedance [sic] level of supply of roughly 2,500,000 acre-feet as read from Figure 5-1. In other words, CalSim II over-predicted deliveries by more than 50 percent."

So these were the kind of criticisms that came out right after CalSim.

Are you familiar with this general observance?

MR. MIZELL: I'm going to object to the relevance of this comment letter, and the question is to a decades' old comment letter on a report.

If Ms. DesJardins has questions about the existing models and the validation or calibration of the existing models, I'm happy to not object to those. But this is very old critique at this point, and I don't see how it's relevant to what we've presented.

MS. DES JARDINS: May I respond?

CO-HEARING OFFICER DODUC: Hold on. Let me just ask. This was directed at DWR, Mr. Munevar and Mr. Reyes, I believe.

From your expert opinion, are these deficiencies or at least these asserted deficiencies, can you address them from the perspective of the current CalSim model?

WITNESS REYES: I mean, I guess there's some points there. The point about the over-prediction in comparing a modeled output that's looking at a projected level and, you know, projected -- or operations that did not happen historically, necessarily, or not operations but regulations that did not happen historically, and comparing that against what happened in actual 2001, I don't think that's a fair comparison.

I mean, the delivery of the reliability report was trying to ascertain how much water could be moved and not how much was moved historically. So it's not a historical simulation.

CO-HEARING OFFICER DODUC: So let me change my question. In response to -- do you know whether in response to this later from PCL in 2005 any changes, recent changes, that were made to CalSim were in

response to these four-or-so deficiencies noted? Does the new model address this?

WITNESS REYES: I don't believe it does because I don't think these -- these issues that were highlighted we view as real deficiencies of the model.

CO-HEARING OFFICER DODUC: So Ms. DesJardins, now you may talk. Where are you going with this?

MS. DES JARDINS: So with all due respect, the historical validation report that is presented as an exhibit and to which Mr. Munevar's testimony refers is of this version. So I want to go --

CO-HEARING OFFICER DODUC: Hold on. Hold on.

Now, which validation report was it, Mr. Munevar, that you -- that you testified to? Was it the same one that Ms. DesJardins just showed, and is that now the basis of your question?

WITNESS MUNEVAR: What is being shown on the screen is a comment letter from PCL, and it was a comment letter on the delivery reliability report not on the validation, the historical validation run. So I can't -- I can't comment on what this -- how the two relate.

CO-HEARING OFFICER DODUC: Will you be linking this to the validation report?

MS. DES JARDINS: Yes. The comment -- the

response by DWR links this to the -- and I wanted to bring that up as the next slide.

CO-HEARING OFFICER DODUC: All right. Let's move to the next slide. And as we continue, Ms. DesJardins, I will ask for the court reporter's sake as well that you do not read everything that's put up there, and rather put up the document, identify it for the record, and then allow all of us a chance to silently read it, and then you can point to whatever specific area that you want to address questions to.

It's going to be a long day, so hopefully the court reporter will hang with us.

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: So your next document?

MS. DES JARDINS: 42 -- no, 43. Yep.

CO-HEARING OFFICER DODUC: Microphone, Ms. DesJardins?

MS. DES JARDINS: There we go. 43. Okay.

(DesJardins Exhibit DDJ-43 identified for the record)

MS. DES JARDINS: So this is the response to comments. And it's -- it's Exhibit DDJ-43.

CO-HEARING OFFICER DODUC: Okay. And rather than reading the whole thing, what --

MS. DES JARDINS: Yes. Yeah.

CO-HEARING OFFICER DODUC: Yeah. So for the record, this is a December 22nd, 2005 response to the PCL letter that Ms. DesJardins previously brought up.

And then your question is?

MS. DES JARDINS: I'd like to scroll down to the bottom, please.

So it states, "Calibration of some of the most important components of the model is possible and has been done. For instance, one of the most important components of the model its hydrologic component --"

CO-HEARING OFFICER DODUC: Actually, could you just give us a chance to read it silently.

MS. DES JARDINS: Yeah. Okay.

CO-HEARING OFFICER DODUC: And then once the witnesses have read it, you can ask the question directly.

You can scroll down a little bit more, Mr. Long, so that the entire -- because it continues on the next page, I believe. Oh, it's not possible.

MS. DES JARDINS: Yes, it does continue on the next page. Yeah.

Okay. So I just want to address the paragraph on calibration. And it states -- let's scroll back up just a little so -- calibration of some of the most

important components of the model is possible and has been done. It refers to the hydrologic component.

I wanted to clarify, Mr. Reyes, is -- is this calibration something that DWR has done and is continuing to do on the hydrologic component of the model?

MR. BERLINER: I'm going to object at this point.

CO-HEARING OFFICER DODUC: One at a time, Mr. Berliner.

MR. BERLINER: Ms. DesJardins is seeking to challenge the CalSim model. This model has been in use for many, many years by this Board, by DWR, by every state and federal fishery agency. It has been reviewed and approved by both state and federal courts.

If Ms. DesJardins wants to challenge the assumption to use for WaterFix, I think that's entirely appropriate, but this model is the state-of-the-art model. And in light of the fact that it's used by this tribunal for its own work, I think that this model is beyond challenge at this point, and any challenge directly to the model is inappropriate at this time.

CO-HEARING OFFICER DODUC: Right. Thank you, Mr. Berliner.

Ms. DesJardins, to what extent has this been

submitted by you as part of the objections that you filed prior to the beginning of the hearing?

MS. DES JARDINS: This specific -- this has not -- this was not in there, and there is a lot of testimony that CalSim cannot be calibrated. And to the extent that that testimony is relevant to the Board's consideration, I respectfully assert that I have the right to examine it in cross-examination. To do otherwise would be to not allow me to cross-examine that testimony.

CO-HEARING OFFICER DODUC: Your objection -- some of your objections that were filed prior to the start of the hearing concern the modeling, concern the CalSim model, concerning the use of that model. And I think there was also a reference to a certain case.

Was that filed with Ms. DesJardins?

So there are objections you have filed with respect to the modeling that are still under consideration by the Board. And rather than grilling a great deal -- I'm going to allow you to proceed to a certain extent, Ms. DesJardins, but recognizing that this is your objections to the model and the premises of the model have been filed is in the record, is still something that is under consideration by the Board, I am not willing to spend hours on this.

And so I will allow you just a little bit of leeway, but I appreciate that you have expressed those concerns. They are still under consideration. So if indeed you need to go into additional details, I would prefer we do that as part of your legal briefings to the Board on the basis of those objections that have been made, and that will give Petitioners a chance to respond to that as part of a briefing process rather than as part of the hearing itself.

MS. DES JARDINS: There are some questions here which need to be answered by the witnesses that testified, and I've tried to keep it just to that. But it will clarify the previous testimony that CalSim cannot be calibrated. That's all I'm trying to do.

CO-HEARING OFFICER DODUC: Yes, and as I said, I will allow you some leeway to ask those questions, but we will not be going into a great deal of detail. If you feel the need to do so, we will find a different avenue, perhaps through a legal briefing-type process, to explore further those issues.

MS. DES JARDINS: Okay. So, Mr. Reyes, I did want an answer to the question. Do you agree that calibration of the hydrologic component -- that you can calibrate the hydrologic component of a model?

WITNESS REYES: Could you repeat that

question? I got lost.

MS. DES JARDINS: So it states here -- this is a prior statement by the Department of Water Resources -- "Calibration of some of the most important components of the model is possible and has been done. For instance, one of the most important components of the model, its hydrologic component, has been calibrated." There's some details.

Do you agree that the hydrologic component can be calibrated and has been calibrated?

WITNESS REYES: Yes, I agree that it can be calibrated and has been calibrated. Yes.

MS. DES JARDINS: That's fine. Okay. That's all I need. Let's go to -- scroll down a little more on this section.

So in the absence -- so the next, "In the absence of classical approach to calibration, the next best approach is generally to set model parameters for simulation run relying on experience and then verifying the results of the simulation run by comparing to historical operations."

And then down at the bottom, it refers to the CalSim II simulation of historical operations, 2003.

Mr. Reyes, do you agree with these statements?

MR. BERLINER: I'm going to object. This

document speaks for itself. And I'm not sure of the relevancy as to whether Mr. Reyes agrees with this old DWR document. To merely read back and say, "Do you agree with this statement?" Yes.

CO-HEARING OFFICER DODUC: All right. Wait.

Ms. DesJardins, let's cut to the chase. The endpoint here that you're trying to get to on the issue of validation, what is it?

MS. DES JARDINS: Oh, okay. Well, I need to go to a slide, then. Let's close this. Close that one and go to Draper excerpts, No. 45. Okay. And pull it up, and I need you to scroll down. Continue. Continue. Continue. Stop. Up. Okay.

(DesJardins Exhibit DDJ-45 identified for the record)

CO-HEARING OFFICER DODUC: Now, for the record, what is this document?

MS. DES JARDINS: So this is -- I was going to introduce foundation, explain what this. So the CalFed science program funded a study of the same Sacramento hydrology that DWR refers to in that report.

And in that study -- this is a report from that study. It was done by Andy Draper and Walter Bourez. They found that there was a significant discrepancy between the Colusa Basin drain outflow --

between the historical and that predicted by CalSim. And it was on the order -- you can see from this graph -- of 200,000 acre-feet between April and October in dry years.

CO-HEARING OFFICER DODUC: Which version of CalSim was used to do this?

MS. DES JARDINS: This is the same version that they're referring to, the same version in the historical validation study that they are saying validates the use of the model.

CO-HEARING OFFICER DODUC: And your question would be how could they explain this difference?

MS. DES JARDINS: Yeah. I wanted to say, this -- this PowerPoint goes into more of the reasons why there's this discrepancy. One is, you know, wouldn't this kind of discrepancy really --

CO-HEARING OFFICER DODUC: But you're not testifying right now. So what is your question to these witnesses with respect to the verification?

MS. DES JARDINS: So in your -- this is the same -- this is -- now I have to go back.

CO-HEARING OFFICER DODUC: Do you want them to explain the discrepancy or at least attempt to?

MS. DES JARDINS: Yeah.

Can you explain this discrepancy? This is the

same version that's in your historical validation study.

CO-HEARING OFFICER DODUC: Assuming that this graph accurately depicts data that was part of your verification study, did you notice the same discrepancy? And if so, do you have any explanation for it?

MR. BERLINER: So just for the record, I have an objection to the question on the grounds that I stated earlier.

An additional point to be made is that we have reiterated over and over again in this proceeding we are using the model in the comparative basis not the predictive. So questions about the predictive value aren't relevant to our testimony.

CO-HEARING OFFICER DODUC: Although I did understand that part of the calibration process is to compare some data with historical data just for calibration purposes.

Is that not the correct understanding?

WITNESS MUNEVAR: Maybe I can provide a little bit of input here.

The statement on the hydrology component being able to be calibrated is that the hydrology is developed with gauged flow, measured gauge flows as its

starting point, and then adjustments are made as we move upstream in order to account for the next upstream gauge and the accretions or the flows or losses that occur between those gauges. And then in a typical projected hydrology, we then adjust that historic hydrology to represent a future condition.

So the statement on the calibration is that we start with measured gauge flows as the basis for the hydrology development.

CO-HEARING OFFICER DODUC: So this kind of comparison that is depicted here, in your opinion, what -- what is the usefulness of this, if any?

WITNESS REYES: I would just say that, you know, as I stated earlier, that our model runs at a fixed level of development and a fixed, usually, level of criteria for Delta standards and regulatory standards. And so comparing that type of simulation to a historical, I guess, gauge data, it's not really a fair comparison because they're not representative of the same system.

CO-HEARING OFFICER DODUC: All right. Ms. DesJardins, I'm going to ask that you use your cross-examination for these witnesses to test the direct testimony they provided as a result of the modeling and not to explore the reliability of the

model itself.

MS. DES JARDINS: Ms. Doduc, with due respect, I do have a right under Evidence -- under 1151(3)(b) to ask questions on any matter relevant to the proceedings. And to the extent that there may be increased flows into the Delta in dry years that aren't there in the model, I would argue that is relevant to this proceeding.

CO-HEARING OFFICER DODUC: Your objection is noted.

And to the extent that your cross-examination is directed to questioning the witnesses on the flows and on the other results of the modeling, that is, in my opinion, relevant and should proceed. However, I will not allow you to explore in general terms the issue of model reliability.

Focus your cross-examination of these witnesses, on their direct testimony as a result of that model.

MS. DES JARDINS: Respectfully, this is meant to explore the direct testimony in DWR-71 that a historical validation study matched the inflows at Freeport with plus or minus 3 percent accuracy. And I would argue based on this that there's other considerations, like, if that plus or minus 3 percent

is April to October in critical dry years, that might be significant.

CO-HEARING OFFICER DODUC: Go to their direct testimony upon which you would like to conduct cross-examination, where you question the result of the modeling and the direct testimony they provided. Go there.

MS. DES JARDINS: I need to -- I just need to look at the actual historical model. It -- respectfully, there is just a little bit more I'd like to do.

CO-HEARING OFFICER DODUC: I have received a lot of respect from you. I appreciate that. But I've given you some direction, and I expect we will go down that pathway.

Mr. Eichenberg?

MR. EICHENBERG: I just want to put out that the reliability of the science upon which these witnesses are basing their conclusions seems that it should be relevant in terms of cross-examination. As expert witnesses, they should be asked to account for the reliability of their assumptions.

CO-HEARING OFFICER DODUC: And, Mr. Eichenberg, thank you. That is noted.

And, again, to the extent that your questions

on reliability are directed towards the direct testimony and the results of the modeling from these witnesses, you may go there, but not on the general reliability of the model itself. Direct your cross-exam to specific modeling output that these witnesses prepared and submitted to the Board for consideration.

MR. EICHENBERG: One more objection, I suppose, is that just because, as Mr. Berliner pointed out, this is the way they've always done it, doesn't mean that it's the right way to do it. And if the science is wrong, then I think that's relevant to this Board. You know, people believed that the Earth was flat for a long time, and that doesn't mean that it should never have been questioned.

CO-HEARING OFFICER DODUC: Comments are noted.

MS. DES JARDINS: Ms. Doduc --

CO-HEARING OFFICER DODUC: No. We are moving on.

MS. DES JARDINS: Yeah. I just --

CO-HEARING OFFICER DODUC: No. We are moving on. Ask your next question, and make sure that your cross-examination of these witnesses is on their direct testimony on the modeling they produced, on the output of that modeling in support of the petitioners'

project.

MS. DES JARDINS: There are issues that the modeling -- the exhibits they produced are very general and do not provide specific details that I need to go into to look at this. And this is why I've looked at previous statements. And I am allowed to use previous statements by DWR to -- this does contradict what they've been saying. So I just -- I would request to look at some more of the modeling assumptions. Thank you.

CO-HEARING OFFICER DODUC: And again, I will say for the last time, your cross-examination of these witnesses must be focused on the direct testimony they provided, the modeling they conducted, the output of that modeling, and whether or not in your opinion that output, their work supports the assertions that they are making.

You are free to question their work output and their testimony as submitted to the Board. Their work product, not the underlying general reliability of the model, which I'm sure as an engineer I would love to go into, but we could spend years discussing.

MS. DES JARDINS: This is just with -- a little bit of stuff with respect to the base version of the model. I'd like to do a little more.

CO-HEARING OFFICER DODUC: No, no. Move on, please.

MS. DES JARDINS: Okay. Put this away.

CO-HEARING OFFICER DODUC: Ms. DesJardins, if you would like some time to think about what specific output from the modeling, what specific testimony these witnesses have provided upon which to pursue your cross-examination, putting aside the reliability of the modeling line of questioning, is there anything else you wish to explore? Or would you like me to go to someone else and come back to you and give you some time to reframe your cross-examination?

MS. DES JARDINS: How about if you do that. Thank you.

CO-HEARING OFFICER DODUC: All right. Let's do that, and we'll get back to you towards the end of the cross-examination list.

MS. DES JARDINS: Thank you.

CO-HEARING OFFICER DODUC: All right. Is Mr. Brodsky here yet? All right. So we will not get to Mr. Brodsky. That means -- well, at least not yet.

Mr. Eichenberg.

MR. EICHENBERG: I believe Mr. Brodsky thought that he was going at the end.

CO-HEARING OFFICER DODUC: Okay. That's fine

too.

MR. EICHENBERG: And I have not delivered my slides or anything to the front desk yet. So if I could have five minutes to get those to them.

CO-HEARING OFFICER DODUC: All right.

MR. EICHENBERG: Appreciate that. Thank you.

CO-HEARING OFFICER DODUC: With that, stand up, stretch. We're taking a five-minute break while Mr. Eichenberg gets ready. So 9:35.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. Microphone on, please.

We are back in session. Took a little bit longer, but before you begin, Mr. Eichenberg, let's do a bit of -- see if I could help refine some of the things that Ms. DesJardins is probably thinking about addressing.

Let me look at Mr. Mizell and witnesses. I think one of the things that you have established throughout the course of this hearing is that the CalSim modeling and DSM2, for that matter, are not predictive tools and that they are meant to be used for comparative purposes.

For the record, would you stipulate that, indeed, these models do not do a good job and should

not be used and are not being used for predictive purposes?

MR. MIZELL: I would like to talk to the modelers about the breadth of that stipulation, but for the purposes of the direct testimony, both written and oral that we've given alone, we are using the models in a -- in a comparative mode not a predictive mode.

In terms of how the models are used globally, I don't think I am currently in a position to say uniformly that we never use them in a predictive mode. But for the purposes of this hearing and the testimony before you, I believe I can make that stipulation, but I would like to check with my modelers at some point, or they can weigh in now to clarify that.

CO-HEARING OFFICER DODUC: Why don't you check with them, and we will hear back from you when Ms. DesJardins comes back to conduct her cross-examination.

The reason I'm raising it now is so that, as she is preparing -- or refining her cross-examination, Ms. DesJardins, I wanted to, I think, clarify that we've all heard and we've just heard Mr. Mizell stipulate that CalSim, for the purpose of this hearing, for the purpose of the petition the Board is considering, is not being used for predictive purposes.

So for the purpose of your cross-examination, I would encourage you to focus on the use of CalSim as Petitioners have submitted them to us, which is as a comparative tool, and bring up any concerns, any questions you have about its credibility as a comparative tool.

Mr. Eichenberg.

MR. EICHENBERG: To some extent, there may be a relationship between its credibility as a comparative tool --

(Reporter interruption)

MR. EICHENBERG: I'm so sorry. I'm probably the worst here for that, so I apologize ahead of time, and I will try to speak slowly.

There my be some relationship between the model's usefulness as a -- or reliability as a comparative tool and its reliability as a predictive tool. I believe that there is some evidence to that extent.

CO-HEARING OFFICER DODUC: If you can bring forth that evidence as part of your cross-examination and it is direct to the testimony that was provided, the modeling result that was provided, then that is a relevant aspect.

MR. EICHENBERG: Much of the review of the

CalSim modeling wasn't done on this specific 2015 WaterFix, and we don't have access to their internal criticisms of the modeling. So without that, we have to rely on the past versions, which we've heard are related. So it seems like --

CO-HEARING OFFICER DODUC: I am -- what I am directing is that the questioning of these witnesses be based on the work that they conducted and not on the underlying premises of the CalSim model itself.

So you have their testimony. You have the model runs that they did. You have the output from that model runs. You have their comparative analysis using that model run. To the extent that you have real data, I suppose, on particular water quality, water supply, water level aspect that you believe is contradictory to the output that they have provided or the assumption that they've provided in doing their analysis, that may be part of your cross-examination.

MR. EICHENBERG: I understand. I would like to have a continuing objection to the limitation on questioning the witnesses on their foundational assumptions.

CO-HEARING OFFICER DODUC: You may ask them on their foundational assumption as part of their analysis that they conducted.

MR. EICHENBERG: Okay. Maybe I don't understand, but I would like a continuing objection to the limitation that you just imposed.

CO-HEARING OFFICER DODUC: Limitation is noted. Proceed.

MR. EICHENBERG: Thank you very much.

Hearing officers, witnesses, thank you.

CO-HEARING OFFICER DODUC: And you need to get closer to the microphone, or bring the microphone closer to you.

MR. EICHENBERG: Is this better?

CO-HEARING OFFICER DODUC: It looks weird.

MR. EICHENBERG: If nothing else, I'll come out of these hearings with a thicker skin. Thank you.

CROSS-EXAMINATION BY MR. EICHENBERG

MR. EICHENBERG: A couple -- so initially, I wasn't sure you want -- I'm thinking maybe an hour, hour and a half, depending on the questions -- the answers I get.

CO-HEARING OFFICER DODUC: And the topic areas.

MR. EICHENBERG: And the topic areas, I was going to cover some initial questions on operational assumptions that were made based on their testimony, some questions about reservoir draw down, questions

about climate change, questions about sea level rise, questions about groundwater, questions about chloride measurements, questions about the governing regulatory assumptions, and some questions about the review of calibration and verification of the modeling, and also some questions about access to data.

CO-HEARING OFFICER DODUC: Okay.

MR. EICHENBERG: There is a lot of topics, but hopefully only a couple of questions in each. So let's hope it doesn't go too long. I'm sure nobody wants to stay late on a Friday. So I'll try to keep that in mind.

I was a little confused about this. Just a few things I want to clear up.

So the WaterFix uses the 2015 CalSim modeling. I think I have that part right. But the final EIS, what modeling does that use? There are a couple different answers.

WITNESS MUNEVAR: The Final EIS uses the 2010 modeling.

MR. EICHENBERG: And to what extent does it incorporate 2015 modeling?

WITNESS MUNEVAR: It does not. For consistency for the EIR/EIS from 2010 through present, the 2010 version of the model has been used.

MR. EICHENBERG: All right. Thank you.

I thought I'd heard that there was some comparison made or something like that between 2010 and 2015, is that not correct, in the Final EIS?

WITNESS BUCHHOLZ: We are planning an appendix that will show a sensitivity analysis in the Final EIR/EIS, but that's not complete yet.

MR. EICHENBERG: And that sensitivity analysis will compare 2015 to 2010?

WITNESS BUCHHOLZ: It will compare one of the runs between -- using both different types of CalSim II modeling.

MR. EICHENBERG: Okay. Thank you so much.

And it was brought up a little bit whether the Water Board uses CalSim. To your knowledge, does the Water Board use CalSim II currently?

WITNESS REYES: Yeah, I believe they use CalSim II currently.

MR. EICHENBERG: Which version does the Water Board use that you know of?

WITNESS REYES: I believe they're using the latest version, 2015, but in the past they've used 2010 as well.

MR. EICHENBERG: Okay. Mr. Munevar, on -- we can pull this up, and I'll describe it too. But it's

DWR-71, which is your testimony, Page 2, Lines 21 through 23. In that, you describe Boundary 1 and Boundary 2 as the outer range of regulatory and operational conditions within the clean WaterFix that could conceivably operate in the future -- within which the clean Waterfix could conceivably operate.

These conceivable boundaries, are they limited by the project's purpose as you understand it?

WITNESS MUNEVAR: Could you remind me the lines you're referring to?

MR. EICHENBERG: Sure. Let's pull that up. Lines 21 through 23.

WITNESS MUNEVAR: Okay. And the question, if you could repeat that, please.

MR. EICHENBERG: These conceivable boundaries that you're talking about, are they limited by the project's purpose?

WITNESS MUNEVAR: I'm not aware of that.

MR. EICHENBERG: So we have established, I think in this hearing, that one of the primary purposes of the WaterFix is to provide the capacity to deliver up to full contract amounts.

That's not factored into these conceivable boundaries?

WITNESS MUNEVAR: I don't believe that is what

was stated. It's certainly not what was stated by Ms. Buchholz yesterday.

MR. EICHENBERG: So that was an incorrect -- that one of the primary purposes of the WaterFix is to provide the capacity to deliver up to full contract amounts, that's not correct?

WITNESS MUNEVAR: That's not correct, and Ms. Buchholz can repeat the statement --

MR. EICHENBERG: Yes, please.

WITNESS MUNEVAR: -- better than I can from yesterday in terms of water supply reliability, I believe is what she used, not full contracts.

MR. EICHENBERG: I'm sorry. Yeah, can we repeat that? Because apparently --

CO-HEARING OFFICER DODUC: Why don't we ask Ms. Buchholz to answer for herself.

MR. EICHENBERG: Yes, Ms. Buchholz, please?

WITNESS BUCHHOLZ: One of the bullets in the project objectives in purpose and need is to restore and protect the ability of the State Water Project and CVP to deliver up to full contract amounts when hydrologic conditions result in the availability of sufficient water and consistent with the requirements of state and federal law and terms and conditions of water delivery contracts and other applicable

agreements.

So you need to take that especially with respect to hydrologic conditions and the other agreements and regulations.

MR. EICHENBERG: Okay. That's a lot to say every time I refer to this. So I was hoping to just say "the capacity" or "the ability to provide full contract amounts," but that's not accurate enough?

WITNESS BUCHHOLZ: Unfortunately, it needs the entire statement because there's limitations either way.

MR. EICHENBERG: Is that entire statement part of the conceivable boundaries limited -- does that limit the project's purpose?

WITNESS BUCHHOLZ: Boundary 1 and Boundary 2 were -- consist -- were two of the alternatives or similar to two of the alternatives in the Draft EIR/EIS which were developed in accordance with the project objectives and purpose and need.

MR. EICHENBERG: Mr. Munevar, your statement about conceivable boundaries, is that informed by these Boundary 1 and Boundary 2 as Ms. Buchholz described them?

WITNESS MUNEVAR: I'm not sure I understand the question. They were presented here to reflect an

outer range with H3 and H4 being the initial operation range. But they were presented here for the Board to understand the changes that might impact legal uses of water.

MR. EICHENBERG: I just want to know if there's a connection between the bullet point that we saw -- and we can pull the bullet point up if that's helpful. It's PCFFA-6. But between that bullet point and your statement about the conceivable boundaries, I just want to know if there's a relationship between those two things.

CO-HEARING OFFICER DODUC: Let me try asking that a different way.

Do you know how Boundaries 1 and 2, how the parameters and the operational conditions for Boundary 1 and 2 were developed?

WITNESS MUNEVAR: Yes, I do.

CO-HEARING OFFICER DODUC: And what consideration went into the development of Boundaries 1 and 2?

WITNESS MUNEVAR: I think as described by Ms. Buchholz, they're looking to represent the range of alternatives and a potential range in which the project could operate but not the initial operational range which is H3 and H4.

CO-HEARING OFFICER DODUC: And to be -- I guess drill down a little further, I'm trying to anticipate Mr. Eichenberg here.

Do you know what -- how the term "conceivably operate," what factors went into that? What aspect went into defining that? Was part of that the deliveries, the commitments that Mr. Eichenberg is asking about?

WITNESS MUNEVAR: I don't believe so. And this is my understanding, is that it was to look at the range of the main parameters that drive the operations.

CO-HEARING OFFICER DODUC: And those main parameters are?

WITNESS MUNEVAR: Being North Delta diversion, outflow, Old and Middle River flow requirements, and the gate operations, the ones that are indicated in Exhibit, I believe, 514, to look at a range of those conditions from a lower outflow type of condition in Boundary 1 to a higher outflow condition in Boundary 2, a higher outflow and more restrictive South Delta in Boundary 2.

CO-HEARING OFFICER DODUC: I'll turn it back to you now, Mr. Eichenberg.

MR. EICHENBERG: So if Boundary 2 were selected and, as you've testified, there was a

predicted 33 percent decrease in deliveries to South Delta, a decrease in South of Delta deliveries, does that fall within the regulatory and operational conditions within which the clean WaterFix could conceivably operate in the future?

WITNESS MUNEVAR: I believe it could operate within there. Whether it would be selected as the proposed project, I don't -- I can't answer that.

MR. EICHENBERG: So it would, but that would fall within the conceivable boundaries that we were talking about?

WITNESS MUNEVAR: Yes, as I indicated in the testimony. Yes.

CO-HEARING OFFICER DODUC: I'm glad you answered so because I asked Ms. Pierre the same question, and that was her answer.

WITNESS MUNEVAR: Oh, good.

MR. EICHENBERG: Mr. Tehrani, you wrote that any operation considered -- sorry. Let's just pull this up so that I can anticipate that. So DWR-66, Page 2, Lines 4 through 5.

You wrote that, "Any operations considered within this change petition proceeding have been evaluated with regard to the effects on legal users of water."

WITNESS NADER-TEHRANI: What lines are you looking at?

MR. EICHENBERG: 4 through 5.

WITNESS NADER-TEHRANI: Oh, okay.

MR. EICHENBERG: Does the bullet point that we've been talking about for the full contract amounts, does that have any impact on which operations you considered in this statement?

WITNESS NADER-TEHRANI: Well, I primarily focused on water quality and water levels, and the tool I used was DSM2. So -- and in my portion of the testimony, I don't make changes. I just take the information from the assumptions that were made in CalSim and then, based on those operational assumptions, I looked at the water quality effects and water level effects.

So as far as, you know, those operational changes, all those decisions are made in the water supply analysis part of it.

MR. EICHENBERG: So if I understand correctly, you did not consider this purpose that we're talking about, to have the capacity to deliver full contract amounts?

WITNESS NADER-TEHRANI: Well, I --

MR. EICHENBERG: I understand that may have

been included in your assumptions, but --

WITNESS NADER-TEHRANI: In the analysis I make, I do not take those issues into account. All those issues are taken into account in the water supply analysis part of it.

MR. EICHENBERG: Great. Thanks.

So I heard two days ago from Mr. Tehrani that DSM2 was based on output from CalSim II, and that's also reflected I think in your testimony at DWR-66, Page 2.

I read Mr. Munevar's testimony that CalSim II uses artificial neural networks to emulate flow/salinity relationships that are derived, in turn, from DSM2. So I was a little confused.

WITNESS NADER-TEHRANI: Yes. There is interaction between the two models.

MR. EICHENBERG: Yeah.

WITNESS NADER-TEHRANI: So CalSim is a water supply model. It's an accounting model. But within it, there are constraints I would have to take into consideration between the flow/salinity relationship because, as an example, D1641 water quality objectives, it needs to be able to calculate the correct volume, and by itself it doesn't have it.

And the tool that's used is called the

"artificial neural network." And the way you derive and train -- the word we use is the "trained ANN" is based on DSM2 results. And in that scenario, we use and look at different extremes of hydrology and basically teach ANN what is the flow/salinity relationship. And that is what is -- then informs CalSim in making proper decisions in how to meet those water quality objectives.

WITNESS ANDERSON: So the use of DSM2 to train the ANN is done before any of the CalSim runs are made. So it's a completely separate, contained analysis that's done first. It creates this ANN that represents Delta salinity in CalSim that's then put in CalSim.

CalSim is run to simulate all these wonderful future conditions. And then DSM2 is run in a separate analysis that uses the inflows from the CalSim model to then look at the impacts on water quality and water level.

MR. EICHENBERG: Thank you, Ms. Anderson. That's much more clear.

So we've heard that DSM2 uses CalSim data. So it doesn't use CalSim data for this ANN calibration that you're talking about?

WITNESS NADER-TEHRANI: In the ANN calibration, the objective is to teach it how flow and

salinity are related. So we subject it to extremes of different configurations based on results from CalSim. Doesn't have to be a specific study. It could be CalSim flows representing different set of operations.

So it -- we take a number of different, you know, operational studies from CalSim to generate.

Anyone else want to --

WITNESS ANDERSON: So then the ANN is trained on results that were generated from CalSim, but they're not the results that were the alternatives that are presented here because those are run after the ANN is trained.

MR. EICHENBERG: Because, to me, it seems like if you're using data from CalSim to set DSM2 and data from DSM2 to set CalSim, it just seems sort of -- I'm not a scientist, but it seems sort of incestuous, and it seem like you might have errors that creep in that get perpetrated.

WITNESS NADER-TEHRANI: Let me give you --

MR. EICHENBERG: I think the analogy may be --

WITNESS NADER-TEHRANI: Let me give you an -- also an example why --

MR. EICHENBERG: I'm not done with my question, actually. Thank you.

WITNESS NADER-TEHRANI: Sorry. Sorry.

Apologize.

MR. EICHENBERG: So what I just said about errors creeping in and using data for one model to set the data for the other model, how -- is that -- is that a problem?

WITNESS NADER-TEHRANI: No. We do not consider that a problem. And the example I was going to give, for example, sea level rise. Okay? So sea level rise has not occurred. So we are looking at future sea level rise scenarios. So somehow we need to teach CalSim that, with six inches of sea level rise, you're going to be in a different world and different volumes of water is required.

And the way we achieve it is through the use of ANN that are trained specially, and that training requires the use of DSM2.

(Reporter interruption)

WITNESS NADER-TEHRANI: Requires the use of DSM2 model.

MR. EICHENBERG: Thank you for that explanation. I appreciate it.

Are you sure that sea level rise hasn't already occurred?

WITNESS NADER-TEHRANI: The studies that are presented here are based on 2025, 2030. So we're

talking about six inches of sea level rise with respect to today.

MR. EICHENBERG: Okay. Another -- sorry if these seem nit-picky, but again, I'm not a scientist. I've been trying to catch up on my modeling, and it's not always going well.

But you described -- Mr. Munevar, you described a monthly-to-daily flow mapping technique used in calculating Fremont and Sacramento Weirs and the North Delta intakes.

Did you use this technique for any other parts of the model? And this is DWR-71, Page 6, in case you in need a reference.

WITNESS MUNEVAR: Yeah. No, I don't need the reference for it. It was only done for the Fremont Weir, Sacramento Weir, and the North Delta diversion.

MR. EICHENBERG: Does it provide greater accuracy for those areas in your modeling?

WITNESS MUNEVAR: I think "accuracy" is a difficult word here.

What we're trying to capture is -- for facilities that are very responsive to daily operations, we wanted to provide a representation of the variability of daily conditions within a monthly model. And both the Fremont Weir and the North Delta

diversion are very responsive to daily flow patterns, particularly in the spring, winter and spring.

MR. EICHENBERG: I see. And why wasn't this done for any other portions of the modeling?

WITNESS MUNEVAR: Because at the base of the model -- or the core of the model is still a monthly hydrology, with monthly reservoir release decisions, monthly hydrology development.

MR. EICHENBERG: So its usefulness is limited and you felt it was only useful in those three situations that you specified? Is that --

WITNESS MUNEVAR: The three areas of the project that were considered at that time or the two areas of the project that were considered at the time that were most impacted by monthly average volume versus a daily variability were the Fremont Weir and the North Delta diversion.

MR. EICHENBERG: So nothing else was impacted as much by daily variability?

WITNESS MUNEVAR: I think less so. Just to clarify that, there was not an attempt to create a daily model as part of this application.

MR. EICHENBERG: I'm not sure I totally understand that, but that's fine. Let's see.

Mr. Tehrani, if we look at DWR-66, Page 2,

Lines 21 through 22, you stated that your modeling provides information in support of how the clean WaterFix can be operated while continuing to meet DWR and Reclamation's responsibilities under the Water Right Decision 1641 objectives.

Is the same true for the inverse? And by "the inverse," I mean does your modeling show that, where DWR and Reclamation have in some -- in the past have failed to meet D1641 objectives as modeled, that they will continue to do so at least to some extent?

WITNESS NADER-TEHRANI: Are you talking about the past actually -- the ones that actually occurred, the exceedances that actually occurred?

MR. EICHENBERG: Yes.

WITNESS NADER-TEHRANI: This is a study that we looked at, you know, with respect to California WaterFix as represented in future levels. So with that, the answer is no. We're not looking at -- and so the explanation I gave was the exceedances that are presented in the model are not real, and I explained the reasons for that.

MR. EICHENBERG: Right. So it would have no predictive ability as far as predicting exceedances in the future?

WITNESS NADER-TEHRANI: I think as Mr. Leahigh

mentioned, there are unusual circumstances that are not captured by the model.

MR. EICHENBERG: Is that a "yes"?

WITNESS NADER-TEHRANI: It does not, no.

MR. EICHENBERG: Okay. Yeah. It does not.

And, Mr. Tehrani, you stated in the -- this is DWR-66, Page 4. I'm looking at Lines 6 through 7. You stated that the 16-year period you used contains the driest two-year drought on record.

Were you referring to just the -- I guess I'm confused about what the record is. So does that conflict with the operations panel testimony that we just had -- extraordinary, unique drought in 2014-2015?

WITNESS NADER-TEHRANI: No. I believe what I'm referring to here is the hydrology within CalSim contains information from 1922 to 2003. And so in that -- within that time period, it does contain the two, two-year --

MR. EICHENBERG: I see.

WITNESS NADER-TEHRANI: Yeah.

MR. EICHENBERG: So when we say "on record," we're not talking about the sort of public record. We're talking about just the --

WITNESS NADER-TEHRANI: What's available to CalSim. Yes.

MR. EICHENBERG: -- '22 to 2003. I see. Thank you.

WITNESS ANDERSON: It's referring to the 1976-'77 drought, which is still considered the most extreme drought we've had in our observational record.

MR. EICHENBERG: So it is more extreme than 2014-2015?

WITNESS ANDERSON: '76-'77 -- there's different measurements of the extreme, but yes, my understanding is that '76-'77 is still the most extreme drought we have experienced.

MR. EICHENBERG: Thank you. Looking at -- switch now to reservoir draw down.

Ms. White, you said that first priority of the modeling is to meet the exchange contracts.

What are the other first priorities? And I have PCFFA-22, Table 4.12. I just want to know if this is an accurate description of these priorities.

MR. BERLINER: Objection, compound question. Two questions.

CO-HEARING OFFICER DODUC: Let's pull this up first, and then Mr. Eichenberg, split that up.

MR. LONG: Mr. Eichenberg, can you please identify what's on the screen right now?

MR. EICHENBERG: I can. I was going to bring

it up a little bit later. I just wanted Table 4.12 which is on the Page 147.

(Pacific Coast Federation of Fishermen's Associations Exhibit PCFFA-22 identified for the record)

CO-HEARING OFFICER DODUC: You need to identify this for the record, the document.

MR. EICHENBERG: This is -- this is DWR's document done in July 2006, Progress on Incorporating Climate Change into Management of California's Water Resources.

Are the witnesses familiar with this document? I see nods. They're nodding. I'll take that as a "yes."

WITNESS REYES: Yeah, I'm familiar with it.

MR. EICHENBERG: Okay. Thank you.

On Page 147, Table -- just zoom in on Table 4.12. That's all I'm discussing right now.

Are those an accurate depiction of the first priorities, or has that changed?

Yes, Ms. White?

WITNESS WHITE: I think this is a general, accurate representation, although there have been modifications to some of the weights over the past ten years. I think this is generally correct, though.

MR. EICHENBERG: Thank you.

And so the other first priorities, then, that go along with what you mentioned are the prior -- are as listed there; is that correct? The prior -- prior water users, minimum instream flow requirements, and WQCP requirements?

WITNESS WHITE: I'm sorry. Are you asking if this is a complete list?

MR. EICHENBERG: Just the first priorities. I just want to know what the other first priorities are.

WITNESS WHITE: Well, this -- first of all, I'm not familiar with this document, although I think it might have been brought up in a prior cross-examination panel, so I saw it then. This report, I believe, is from 2006. Is that what I saw?

MR. EICHENBERG: Yeah, that's right.

WITNESS WHITE: So it's prior to the 2008-2009 biological opinions. So I don't think this includes any of those requirements.

MR. EICHENBERG: Okay. So plus the BiOps?

WITNESS WHITE: Correct.

MR. EICHENBERG: Okay. Thank you.

Mr. Munevar, at --

Pull up DWR-71, Page 5. Mr. Long, thank you very much for following along.

Mr. Munevar, you said that meeting regulatory requirements, including Delta water quality objectives, is the highest operational priority in CalSim II; is that right?

WITNESS MUNEVAR: I'm looking for the location. Can you give me the page and line number?

MR. EICHENBERG: Page 5, Line 2 through 4.

It doesn't really require an explanation. I'm assuming that dead pool conditions limit the ability to meet that highest operational priority; is that right?

WITNESS MUNEVAR: During conditions in which there's not sufficient supply to either meet dead pool or downstream highest-priority uses, water is essentially passed through the reservoir. So inflow becomes outflow. There's no increase in storage. And to the extent that water is meeting the requirements, it still would meet those highest-priority requirements.

MR. EICHENBERG: And the lack of water in storage would limit the operator's ability to meet requirements that were not met by through flow; is that right?

WITNESS MUNEVAR: It could, although exports would likely be curtailed at the same time frame such that outflows and water quality control, salinity

requirements would likely still be met.

MR. EICHENBERG: So I believe we've heard testimony that dead pool does occur in the modeling. I'm a little -- so I don't -- why does dead pool occur if the priority is to meet these requirements and meeting the requirements is inhibited by dead pool conditions? Shouldn't the modeling -- that's a compound question. But why does dead pool occur in light of the problems that you would have meeting your number one priority?

WITNESS MUNEVAR: In the modeling, we specify dead pool as essentially the minimum storage level that would -- that we'd hold water in to maintain that, at least that dead pool.

MR. EICHENBERG: Why does dead pool occur in the modeling when -- in light of your number one priority being to meet these conditions?

WITNESS MUNEVAR: I think it's a representation of a condition in which the operators either have difficulty releasing flows to the physical capabilities or other operational considerations.

MR. EICHENBERG: Would you say that the model is broken?

WITNESS MUNEVAR: I would not use that term.

MR. EICHENBERG: Likewise, Mr. Tehrani, you

said that CalSim II prioritizes meeting D1641 water quality objectives.

Why aren't exports curtailed to maintain enough storage to prevent dead pool in light of that statement?

WITNESS NADER-TEHRANI: I was making a general statement that it is the CalSim model that does the water quality, tries to -- makes an attempt to meet the water quality objective. Anything beyond that, I think it would be Mr. Munevar's.

MR. EICHENBERG: I see. Thank you.

WITNESS MUNEVAR: Just a clarification on that. Exports -- curtailing exports does not necessarily mean you have an increase in storage upstream. Most of these conditions in which we see dead pool operations are associated with requirements that are upstream of the exports; instream flows, obligations on the system that are outside of the Delta.

So I think the premise of your statement is incorrect, that exports would provide upstream storage. If you could reduce exports, you would provide upstream storage.

MR. EICHENBERG: Maybe not in all circumstances, but in some circumstances, certainly you

would have more upstream storage if you curtailed exports, wouldn't you?

WITNESS MUNEVAR: I think in the conditions that you are particularly talking about, dead pool, I do not think that is the case.

MR. EICHENBERG: Why not?

WITNESS ANDERSON: I just wanted to clarify that -- and, Armin, please correct me if I'm wrong on this -- that dead pool occurs when you have very low inflows, and it's those low inflows that are leading to the challenges that then lead to the challenges in meeting all these other requirements.

MR. EICHENBERG: So there's no -- there's no adjustments the model could make to reduce dead pool, the dead pool condition results?

WITNESS WHITE: I think what you're asking is why didn't the model prioritize higher carryover storage year to year to avoid dead pool; is that correct?

MR. EICHENBERG: Sure. Thank you.

WITNESS WHITE: I think the answer to that, we've heard alluded to from Mr. Munevar and Mr. Milligan, is that when we get into situations where we have low inflow, as indicated by Ms. Anderson, the requirements that are long-term contractual or

regulatory requirements are a struggle to meet. If you have all of them, you would have to cut something somewhere.

And as we've already alluded to, CalSim doesn't model the TUCP or other temporary changes, whether they are to contract values or to any of the other regulatory requirements. We don't model short-term agreements that are not a part of any long-term planning process. So, therefore, the result that you get is we don't have enough storage to meet everything.

MR. EICHENBERG: I think I understand that.

I was also confused at DWR-71, Page 11. It says, "Reservoir releases are consistently lower in drier years under the modeling."

I thought that modeling sometimes showed dead pool when historical values did not show dead pool?

WITNESS MUNEVAR: It would be helpful if you could refer to the line number.

MR. EICHENBERG: Page 11, Line 11 through 13, says, "Reservoir releases are consistently lower in drier years under the modeling"; is that right? 11 through 13? Oh, yeah, in September.

WITNESS MUNEVAR: Correct.

MR. EICHENBERG: So if they're lower but the

modeling sometimes shows these dead pool conditions, and historical values don't show the dead pool conditions, yet there's lower releases in the modeling, how does -- can you explain that? That seems like a discrepancy to me. Can you explain it?

WITNESS MUNEVAR: I think what this statement is referring to is in particular due to Shasta temperature control, that during -- in September in particular, there was likely to be high releases historically in those drier years. But again, the flexibility that occurs historically is not necessarily incorporated into the modeling, and I think that's what this statement refers to.

MR. EICHENBERG: It only refers to Shasta temperature control?

WITNESS MUNEVAR: I believe that was the -- the primary thought process in developing this statement.

MR. EICHENBERG: Mr. Munevar, you state that storage levels are not always attainable in CalSim II modeling due to competing water right or regulatory flow needs downstream of these reservoirs. I think these are the dead pool conditions the model sometimes turns up.

Is it -- I think we have already covered this,

but is it possible to cut exports enough to prevent this condition?

WITNESS MUNEVAR: Yeah, I think I already testified that, in many of these years or most of those years in which we have the extreme low storage conditions, export curtailments are already occurring, and further export curtailments are not likely to generate water upstream because there's not stored water releases that are not -- that are being released for exports.

That would be the only way you get an upstream storage improvement is if you had a stored-water release for export in those years.

MR. EICHENBERG: So it's -- I want to look both -- not just as the reaction to a dead pool condition but prior to the dead pool condition as well.

Is it possible to cut exports enough to prevent future dead pool conditions?

WITNESS MUNEVAR: In the development of the modeling over a number of years, we've looked at the most severe droughts, '28 to '34, '76 to '77, '87 to '92. And during the conditions in which the modeling reaches dead pool, we look for the times in which -- over that period in which the modeling is suggesting that there's a stored-water release. And we are

essentially dropping the desired export levels such that we are not calling on additional stored water during those years. So that would be the years preceding the actual advent of the -- of the dead pool condition in Shasta in particular.

MR. EICHENBERG: But you couldn't cut exports any further in those years preceding the advent of the dead pool condition?

WITNESS MUNEVAR: It is unlikely.

MR. EICHENBERG: But you can't say with certainty whether you could cut those exports or whether cutting exports would result --

WITNESS MUNEVAR: I think it's important to understand the nature of these droughts. They don't -- are we okay?

CO-HEARING OFFICER DODUC: Finish that thought.

WITNESS MUNEVAR: I think the nature of these droughts are that there's -- they tend to be preceded by very wet years. And so during those wet years, there's not a long enough forecast that says we're entering into a six-year drought.

MR. EICHENBERG: I see.

WITNESS MUNEVAR: So during those wet year conditions, there will be exports that will be made.

And then the next year or even later in that year, it will turn very dry. This is the reality of it. I know there's an attempt to be oversimplified in the discussion, but it's quite more complex than just trying to cut a previous year in which you didn't know it was going to be dry.

MR. EICHENBERG: I see. So a longer forecast would help?

CO-HEARING OFFICER DODUC: Hold on.

No? You're good, Ms. Morris?

MS. MORRIS: He already answered the question, so I'll wait.

CO-HEARING OFFICER DODUC: Okay.

Mr. Eichenberg, be forewarned that Ms. Morris is waiting to pounce.

MR. EICHENBERG: I'll move a little further --

A longer forecast would help, is what you're saying; is that correct? If a longer forecast was available, then it would be --

WITNESS MUNEVAR: A longer multi-year forecast would help, which currently does not exist.

MR. EICHENBERG: Exist, yeah. Thanks.

I'm going to move on to another subject.

CO-HEARING OFFICER DODUC: Before you move on, Mr. Eichenberg, I know I've been harsh on you, but let

me just say, that was excellent. You questioned the reliability of the models as used by these witnesses and in the results that they presented. That was exactly what I wanted you to do.

MR. EICHENBERG: It's not going to help with my tough skin, this praise.

CO-HEARING OFFICER DODUC: I just wanted to note that that was what you did. You questioned the reliability of the model as a tool that they used in conducting their analysis and in making their case to this Board.

MR. EICHENBERG: Thank you.

I'll try not to let it go to my head.

I'm going to move to climate change.

Mr. Munevar, you said that the application of climate information in the clean WaterFix modeling represents the best science available at the time.

What time are we talking about? We can pull that up. It's at DWR-71, Page 13, Line 25 through 26, if that helps, but maybe you can answer without seeing it, too.

WITNESS MUNEVAR: I think the statement refers to the climate change information, and it was all developed -- I don't recall the specific year. I believe it was 2000- -- 2009 or early 2010 in which it

was developed.

MR. EICHENBERG: Okay. And you said that you only used one climate change scenario for all of your -- all of your scenarios. This is Page 10.

Why is climate change treated as a set variable?

WITNESS MUNEVAR: Can we go to that page, please?

MR. EICHENBERG: Sure. Page 10, Lines 21 through 22. And there's another spot too, on Page 14. But we can just focus on Page 10, 21 through 22, I think. That one.

All operational scenarios modeled for purposes of this hearing make the same climate change assumptions?

WITNESS MUNEVAR: Correct.

MR. EICHENBERG: So why is it treated as a set variable instead of looking at more than one scenario?

WITNESS MUNEVAR: So perhaps you've not been able to review the documents, but we do look at a range of conditions that are part of the Draft EIR/EIS and the recirculated draft. And I believe they're also --

MR. EICHENBERG: My question -- sorry to interrupt you. My question is not about those documents, though. My question is about your testimony

as far as the WaterFix and your statement that you only used one scenario.

WITNESS MUNEVAR: I believe my --

MR. MIZELL: I object to the questioner interrupting the expert when he's trying to answer the question. If we could at least allow him to finish one sentence?

CO-HEARING OFFICER DODUC: Hold on. Actually, I thought his interruption was good, and I was going to do the same interruption, in that my understanding of your question, Mr. Eichenberg, was why the same climate change scenario was used for all the scenarios. I believe you did cover that yesterday, but let's cover it one more time.

WITNESS MUNEVAR: I'll respond directly first, then. The same climate change assumptions are included in the no action as well as all the California WaterFix scenarios.

CO-HEARING OFFICER DODUC: And his question was why?

WITNESS MUNEVAR: Because climate change is a condition that is likely to occur or will occur independent of the California WaterFix. We're not trying to develop a mitigation measure for climate change as part of the California WaterFix. So

therefore, by including climate change in the no action and the WaterFix, we can see how both the no action is affected and the WaterFix is affected under those future climate change assumptions.

MR. EICHENBERG: So my understanding is there's a range of possible climate change scenarios.

Shouldn't -- shouldn't you try them all, or shouldn't you try a couple of them? I mean, not all of them. I'm sure there's a lot. Shouldn't you try a couple of them and see if the results are different for the WaterFix? Or --

WITNESS MUNEVAR: Yeah, and I think that's where my response was heading. So I was trying to answer both of them at the same time.

We considered over 112 individual projections of what the future might consider. From those 112, we developed five what we call "ensemble scenarios," and those five ensemble scenarios are what is included in the Draft EIR/EIS.

MR. EICHENBERG: But those scenarios were never run against the WaterFix; is that right?

WITNESS MUNEVAR: There is a -- there is an appendix that compares the no action for all of those five climate scenarios as well as -- I believe it was Alternative 1 at the time, with all of those five

scenarios.

MR. EICHENBERG: But we've been told over and over again that the WaterFix is different than the EIR/EIS. So my question is were the scenarios run for the WaterFix?

WITNESS MUNEVAR: The runs that were prepared for the Draft are the only runs that I'm aware of in which we looked at the five scenarios.

MR. EICHENBERG: Good enough. Thank you.

Now if we could pull up PCFFA-22. It's that document that we were looking at before which I believe the witnesses said they were familiar with, on pdf Page 147. It states that, "When models reach dead pool, they have lost control of meeting the watershed's most basic needs, not to mention the lawful obligations of the CVP and SWP."

You can review that statement if you like. I just want to know if you agree with that characterization.

CO-HEARING OFFICER DODUC: And as you're reading that, Ms. DesJardins --

MR. EICHENBERG: Might need to scroll down.

CO-HEARING OFFICER DODUC: One at a time.

MS. DES JARDINS: I was just wondering if we could scroll down so I can see that.

MR. EICHENBERG: Yeah. It's not up there yet, so we need to scroll down to the highlighted portion.

Thank you. Thanks, Mr. Long.

WITNESS ANDERSON: Could we please zoom in a little further to make it easier to read? Thank you.

CO-HEARING OFFICER DODUC: Do you not have a monitor right there? Oh, okay.

WITNESS ANDERSON: It's a teeny-tiny.

MR. EICHENBERG: You got the bad desk.

Do you agree with the characterization there that the model has lost control?

WITNESS MUNEVAR: Who are you directing your questions to?

MR. EICHENBERG: Mr. Munevar would be fine or whoever there, but I guess Mr. Munevar.

WITNESS REYES: I can respond since this is a DWR document.

MR. EICHENBERG: Sure. Thanks.

WITNESS REYES: Yeah, when you reach dead storage, as we've said, at that point you're just passing inflow and trying to meet these higher-priority needs as best you can.

So that's what is meant by "you lost control," because you don't have -- if you're short of a certain requirement or a certain higher-priority contract water

right or whatever it may be, then you're not able to meet it with any stored water.

So that's what's the meaning of "lost control," which we've mentioned before.

MR. EICHENBERG: Thank you.

Does anybody on the panel disagree with this characterization? Ms. White?

WITNESS WHITE: I agree with what Mr. Reyes said, although I'm not exactly sure the context of this last section. I'm not familiar with this report, as I stated before, other than it being brought up for other cross-examination. So I'm not sure the last part of the highlighted section -- I would want to read the rest of the report to say whether or not I really agreed with that.

MR. EICHENBERG: Thank you for that caveat, and I won't grill you on this document. Promise.

Mr. Reyes, you were the one who answered that question, right?

WITNESS REYES: Yes, I answered that question.

MR. EICHENBERG: Thank you.

Mr. Reyes, do you agree what such a simulation is broken and that it cannot be confidently compared to an unbroken simulation?

WITNESS REYES: I believe this document was

developed back when we were exploring extreme climate change, and this refers to times when -- if one study were to be at dead storage for an extended period like nine, ten months or something like that, compared to another study that did not have such drastic results of a different climate change scenario. It was difficult to compare the results of those two because of that extended drought. So these were extreme climate change conditions.

MR. EICHENBERG: So the climate change conditions that were modeled for the clean WaterFix, would you qualify those as non-extreme climate change scenarios in light of your statement?

WITNESS REYES: These studies, I believe, looked at the end-of-century climate change, and they looked at things in terms of, like, CO2 emissions and things like that, where human practices would go unabated and you would get this extreme climate.

And, yeah, I don't believe that what -- the California WaterFix, for this hearing, is only looking at year 2025 or centered around year 2025. So, yeah, compared to end-of-century climate change, it's not as extreme.

MR. EICHENBERG: Thank you.

So where it says it cannot be confidently

compared to an unbroken simulation, would that be one issue with trying to incorporate other climate change scenarios into the clean WaterFix modeling because you couldn't compare a broken simulation like what would happen with an extreme climate change simulation to the 2025 scenario?

WITNESS REYES: I got confused by your question. Could you repeat that, please?

MR. EICHENBERG: We were talking earlier about how we were only using the 2025 scenario. We hadn't looked at a range of climate change scenarios for the WaterFix, specifically for the WaterFix.

Is this highlight one reason why it would be difficult to incorporate other climate change scenarios into the WaterFix modeling?

WITNESS REYES: No, I don't believe so.

MR. EICHENBERG: So --

WITNESS REYES: I think this is comparing -- I mean, I think this statement was meant to say when you're comparing different climate change scenarios against each other, if we were -- for WaterFix we'd want to compare, you know, the same climate change scenario against all of the alternatives.

MR. EICHENBERG: Mr. Munevar, this doesn't change your statement that the modeling is not broken,

I think is what you said; is that right?

WITNESS MUNEVAR: That's not what I said. I said I would not use the word "broken."

MR. EICHENBERG: Not use the word "broken." You still would not use the word "broken," right?

WITNESS MUNEVAR: And I still would not use the word "broken," five minutes later, still.

MR. EICHENBERG: On the next page, if we can go to the next page, it has some recommendations for changing the rules that divide available water into delivery and carryover.

Do you believe that such an investigation has been done, Mr. Reyes? We can pause and read that.

WITNESS REYES: Yeah, I need some time to read this.

Yeah, speaking for the SWP, I mean, we -- for Oroville there is a carryover rule that the operators use, and that is what we follow in our CalSim modeling because it's reflective of current operations.

These types of investigations, you know, they can be done. However, I think for the California WaterFix, we were trying to represent what -- the operations that are currently practiced today with our reservoirs, if we're going to maintain those. And we didn't make the adjustments because I think you would

try to make the adjustments separately for each and every alternative, and it would make it difficult to compare the results of the operations against each other.

MR. EICHENBERG: So you did not make the adjustments recommended in this report for the WaterFix?

WITNESS WHITE: Could we possibly scroll and see what section this is under?

MR. EICHENBERG: 4.6.1.

WITNESS WHITE: Well, thank you. I meant the title.

MR. EICHENBERG: All the way.

WITNESS WHITE: It sounds like this is addressing, as Mr. Reyes noted before, extreme climate change and how we might adjust CalSim to handle extreme climate change. And it might be worth doing. There is a difference between various models of the same level of climate change versus various levels of climate change.

I'm certainly not the expert in that, but when you're talking about a 2100 climate change level versus 2025, that's a different scenario than talking about different representations of 2025.

So if you're -- when we're referencing different levels of climate change, maybe we're

specifying what we're talking about. And I think in this one, it's looking at more extreme levels, which is why I was curious what -- again, I'm not very familiar with this. I'm curious what this is referring to, and those acronyms. I see a lot, a very high frequency of dead pool which is not reflected in our California WaterFix modeling.

MR. EICHENBERG: With all due respect, you said that you were not familiar with this document, and you just said that you're not an expert in this type of analysis. So if I could direct my questions to Mr. Reyes, I's appreciate that. Thank you.

CO-HEARING OFFICER DODUC: Ms. Morris, pounce away.

MS. MORRIS: Yes, thank you.

I'm going to object this line of questioning. I think that this is irrelevant because they've already said what the climate change assumptions are.

If Mr. Eichenberg wants to ask about why didn't they use a different climate change and why they think that's sufficient, this would be more relevant, rather than looking at these extreme climate change report and asking questions on this, which is irrelevant to the analysis that was done for this project.

CO-HEARING OFFICER DODUC: Could we go back to the paragraph that Mr. Eichenberg was focused on in his questions?

MR. EICHENBERG: Yes, pdf 148, I think.

CO-HEARING OFFICER DODUC: So, Mr. Eichenberg, how about if I phrase your question this way.

Since 2006, when this report was generated, has there been any changes to CalSim in terms of the rule dividing available water into delivery and carryover?

WITNESS REYES: I don't recall when we incorporated the change in Oroville's carryover storage. There was a point where the operators modified their rule and we subsequently modified it in CalSim. So I don't recall if it was before or after 2006, but at some point we did make a change.

CO-HEARING OFFICER DODUC: So it may not be necessarily in response to a climate change analysis, but apparently there has been some change made.

MR. EICHENBERG: Don't know what year, though.

CO-HEARING OFFICER DODUC: So you may go with that.

MS. RIDDLE: How about the CVP reservoirs?

WITNESS MUNEVAR: This is a report from 2006, so it's probably 2005 modeling that was relied upon,

and there were adjustments to the modeling all the way through 2007, '8 and '9 that were post this report.

So while I can't say exactly, I -- it would be my understanding that there are changes to both the State Water Project and CVP delivery allocations that were updated since this report.

MR. EICHENBERG: Did someone ask about CVP reservoirs? That wasn't --

CO-HEARING OFFICER DODUC: That was Ms. Riddle.

MR. EICHENBERG: Okay. That was answered. Okay. I was confused about who's talking.

WITNESS WHITE: Can I clarify? I recognize that I'm not an expert in this, but this paragraph is talking about if you have dead storage, 31, 29, 21 percent of the time -- or 21 months out of the record, that's when the recommendation is to look at different rules. That's not applicable to what we see in the results of the California WaterFix.

CO-HEARING OFFICER DODUC: All right. Moving on, please.

MR. EICHENBERG: Yes, let's move on to another topics; sea level rise.

What level of sea level rise did you use in your modeling? Mr. Munevar, let's start.

WITNESS MUNEVAR: I'll respond, and then I think Parviz can chime in.

The sea level rises is -- for the California WaterFix was 15 centimeters, as we testified, which is roughly six inches, reflecting kind of the median change, expected or projected change at the 2025-2030 horizon.

MR. EICHENBERG: And is that at the Golden Gate Bridge or in the Bay?

WITNESS MUNEVAR: That is in open ocean which -- which would be similar at Golden Gate and would also be similar at Martinez.

MR. EICHENBERG: Okay. And at what level of sea level rise would saltwater enter the tunnels as currently configured?

MR. BERLINER: Objection, assumes facts not evidence. There's no evidence that salt will enter the tunnels.

MR. EICHENBERG: Cross-examining an expert witness.

CO-HEARING OFFICER DODUC: Hold on.

Mr. Reyes, answer to the best of your ability. If you don't know, you don't know.

WITNESS MUNEVAR: I think I'll take --

CO-HEARING OFFICER DODUC: Or Mr. Munevar.

WITNESS MUNEVAR: I'll take this one, and then Ms. Anderson might be able to jump in.

In the Draft EIR/EIS when we were conducting modeling, we used a three-dimensional model that looked at from 15 up to 1.4 meters, so 140 centimeters of sea level rise, and found we had substantial sea water intrusion in the San Joaquin system and the Sacramento up to about Rio Vista.

But there was not a substantial change in salinity at the North Delta intakes associated with even with the very high level of sea level rise, and that's because of the confined channel and the flow coming on the Sacramento River that is still able to hold back the salt intrusion in that area.

MR. EICHENBERG: So a foot is about 30 centimeters?

WITNESS ANDERSON: 1.4 meters is roughly 55 inches.

MR. EICHENBERG: So 140 centimeters. I wish that our country would change its measurement system, but I grew up with this. 140 centimeters in feet?

WITNESS ANDERSON: 55 inches.

MR. EICHENBERG: 55 inches. Thank you.

Did you look at -- did anybody look at what the historic extent of saltwater intrusion into the

Delta is?

WITNESS SMITH: Are you talking pre-project or post project?

MR. EICHENBERG: Pre-project.

WITNESS SMITH: Pre-project, yes, we're familiar, at least from the Delta Atlas. I don't know how far back you want to go for historic.

MR. EICHENBERG: How far up does saltwater intrude into the Delta, pre-project?

WITNESS SMITH: In a pre-project condition -- I'm trying to remember where -- at least where X2 was from our thing. It may -- it goes up pretty far. It goes past --

WITNESS ANDERSON: The maps in the Delta Atlas are at one part per thousand, not two parts per thousand.

WITNESS SMITH: Right. And I was looking at some modeling runs when I thought about that. But thank you.

MR. EICHENBERG: "Pretty far," is that past Sacramento?

WITNESS SMITH: Not past Sacramento.

MR. EICHENBERG: Past the Delta intakes?

WITNESS SMITH: It's definitely past Rio Vista. And I don't think it made it -- the studies I

looked at -- and I may have brought up the Delta Atlas because that was in a different measurement thing -- I don't believe it actually made it up to where the intakes were.

MR. EICHENBERG: Thank you.

Did you consider other sea level rise estimates? I assume the answer's no, but I just want to establish that.

WITNESS MUNEVAR: What?

MR. EICHENBERG: Sorry. Purely for the WaterFix modeling, did you model any other sea level rise estimates?

WITNESS MUNEVAR: For the WaterFix modeling that's presented here, there's only the 6 inches. The draft has 15 up to 1.4 meters that are in Appendix D7; 5A, D7.

WITNESS ANDERSON: I want to point out that that 6 inches falls within the range of recommended sea level rise for planning that's put out by the California Coastal Commission. They recommend that you look at, for 2030, somewhere between 2 and 12 inches of sea level rise. So that is consistent with the State's current planning process.

MR. EICHENBERG: Thank you.

That's an excellent segue for me. If we could

pull up PCFFA-8.

CO-HEARING OFFICER DODUC: Mr. Eichenberg, are you switching topic, or do you have much further to go on this one?

MR. EICHENBERG: I have a couple more questions about sea level rise, and then one question about groundwater, one about chloride measurements. That was mostly covered, so it shouldn't take too long.

CO-HEARING OFFICER DODUC: I would like to give the court reporter a break. So lets finish up your few questions on sea level rise, and then we'll take a break.

MR. EICHENBERG: Thank you. Yes, let's do that.

CO-HEARING OFFICER DODUC: I'm assuming that you'll need additional time beyond your one hour?

MR. EICHENBERG: Yes, please, may have additional time?

CO-HEARING OFFICER DODUC: How much time? You have about, what, four topic areas left?

MR. EICHENBERG: I think can I do it in a half an hour.

CO-HEARING OFFICER DODUC: All right.

MR. EICHENBERG: Let's hope.

CO-HEARING OFFICER DODUC: We'll give you an

additional half an hour.

MR. EICHENBERG: Thank you.

MS. McCUE: Could you repeat that exhibit number again? I thought you said 8.

MR. EICHENBERG: 8.

MS. McCUE: 8.

(Pacific Coast Federation of Fishermen's Associations' Exhibit PCFFA-8 identified for the record)

MR. EICHENBERG: Looking at Page 304. And I apologize. I'm not finding the pdf number here. It's confusing because it's an attachment to it. This is the Delta Vision Blue Ribbon Task Force Independent Science Board's Examination of Current Literature and Recommendations on Sea Level Rise.

Were you aware of the possibility as described here that ice sheets --

CO-HEARING OFFICER DODUC: I'm sorry. Hold on. Are you still looking for the document?

Let's do this. Let's take our 15-minute break now.

MR. LONG: We don't have 8 from this morning.

CO-HEARING OFFICER DODUC: Let's take our 15-minute break now so you can find the document.

MR. EICHENBERG: I'm sorry. It's not in my --

CO-HEARING OFFICER DODUC: Oh, it's not? Okay.

MR. LONG: So it's on the Board's website?

MR. EICHENBERG: Yes, or in whatever storage you have for the exhibits. I was told that I didn't have to provide the exhibits that have already been introduced.

CO-HEARING OFFICER DODUC: All right. We are going to take our 15-minute break. We will resume at 11:05.

MR. EICHENBERG: Thank you.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It's 11:05. We're back in session. And before we get back to Mr. Eichenberg, Mr. Ochenduszko has an announcement to make.

MR. OCHENDUSZKO: Just for the webcasting folks as well as those in the room, we've been receiving numerous requests on the exhibits that are being brought up. So the exhibits that we're receiving both today and yesterday for cross-examination, we'll have those up on the Web on Monday. As well, we've received numerous requests for the video, and we've had a little bit of a staffing issue. So we'll get those up on the Web as well on Monday.

So those are forthcoming. We haven't forgotten about them.

CO-HEARING OFFICER DODUC: And that's your excuse to have a weekend that's hopefully not watching video and whatnot of this hearing.

Mr. Eichenberg, please continue.

MR. EICHENBERG: Thank you.

We are looking at the PCFFA-8, and I wanted to look at Page 3 of 4. If we scroll down, I think it's the first highlighted portion.

WITNESS ANDERSON: Before you scroll, can we wait until we see the cover, please?

MR. EICHENBERG: This is the Delta Vision Blue Ribbon Task Force on the Independent Science Board's Examination of Current Literature and Recommendations on Sea Level Rise.

CO-HEARING OFFICER DODUC: Dated September 6th, 2007.

MR. EICHENBERG: Kind of a while ago, I guess. Page 3 of this Independent Science Board. Thank you.

Is anybody familiar with the -- this comment here that ice sheet instability could result in an additional 39 inches of sea level rise?

WITNESS ANDERSON: Yes.

MR. EICHENBERG: And their are further

statement that the range of sea level projections based on greenhouse gas emission scenarios contained in the IPCC 2007 report should be viewed at best as a minimum for planning purposes?

MR. BERLINER: Just a point of clarification, because some words were omitted, that this is looking at sea level rise to 2100.

CO-HEARING OFFICER DODUC: I'm sorry. 2100, yes.

MR. BERLINER: Right. So we're just to put this comment into perspective.

MR. EICHENBERG: I believe that the witnesses testified that they've looked at a range for the -- in the EIR documents that went up to 55 inches which is also the range here.

CO-HEARING OFFICER DODUC: So noted. And you have a question?

MR. EICHENBERG: Were you -- are you familiar with the concept that the range of sea level projections that the Independent Science Board -- sorry. Are you familiar with the Independent Science Board's recommendation that the range be regarded as, at best, a minimum for planning purposes as reflected here in the highlighted section?

WITNESS MUNEVAR: This highlight is referring

to IPCC's projections of sea level rise.

MR. EICHENBERG: Mm-hmm. Yeah, are you familiar with that?

WITNESS MUNEVAR: I am familiar with that.

MR. EICHENBERG: And was it -- was this taken as a minimum for planning purposes in your modeling?

WITNESS MUNEVAR: We relied -- I'll let Jamie chime in, but we relied on estimates that were both informed by this report as well as other studies at the time and have been confirmed since that time in terms of the CORS Guidance, the California Coastal Commission's Guidance, and States of California, Washington and Oregon.

WITNESS ANDERSON: The National Research Council's Guidance.

WITNESS MUNEVAR: Thank you.

WITNESS ANDERSON: I'm sorry. The National Research Council, 2012. That's the state of the art in sea level rise information for the West Coast. And that is what was used to develop the California Coastal Commission's guidance range for 2030, which was 2 inches to 12 inches of sea level rise, which was issued in 2015.

So even though these studies started earlier and used information from the time the studies were

developed in about 2010, that that information still fits into the current guidelines that have been updated.

MR. EICHENBERG: And was the range, which I believe here is indicated as 20 to 55 inches, and I think that's sort of what you said the range was, was that range considered a minimum for planning purposes in the modeling?

WITNESS MUNEVAR: I think there's some confusion. This statement, it says the range of sea level rise projections based on the IPCC report should be used as a minimum. The IPCC's projections of sea level rise were at the time substantially lower than what the NRC was projecting. So it refers only to the IPCC projections.

WITNESS ANDERSON: And those newest recommendations that I referred to do take into account the ice sheets.

MR. EICHENBERG: The Independent Science Board is here recommending that the range, the full range of climate projections including through 2100, be used as a minimum for planning purposes.

Was that done in the modeling?

WITNESS BUCHHOLZ: If I may. This information from IPCC 2007 as well as Delta Vision 2009 was used to

make a range of projections for sea level rise out to 2100, and then was used statistically to come back to a proposed range for sea level rise at 2025, 2030, and at 2060. And this information is presented on Page 5A-A69 of the Draft EIR/EIS.

MR. EICHENBERG: If we could pull up PCFFA-9 and look at Page 3. This is the Delta Independent Science Board. We can stay here for a second so they can -- the witnesses can see.

Delta Independent Science Board's comments on the Draft EIR/EIS dated May 15th, 2014. And then we can go to Page 3, which is what I think it indicated. Page 3.

Do you agree with -- well, let's -- we can get to Page 3 first. Not Page 3; the pdf. I'm sorry. It's 3 of the document. I think it should be highlighted. So -- yeah. There we go. Thank you.

Do you agree with these comments that climate change and sea level rise are not adequately evaluated?

WITNESS ANDERSON: No.

MR. BERLINER: Again just a point of clarification. This is talking about the BDCP not the California WaterFix.

MR. EICHENBERG: I think I said that, yeah.

CO-HEARING OFFICER DODUC: All right. So,

Mr. Eichenberg.

MR. EICHENBERG: Yes, I got an answer. The answer I think was no. Hopefully, that's on the record. Thank you. We can move on.

WITNESS ANDERSON: Just so I'm clear. My answer was no. I do not agree with that statement that climate change and sea level rise were not adequately evaluated. I do not agree with that statement.

MR. EICHENBERG: Thank you.

Anybody else on the panel feel otherwise? I assume not.

No answer. We'll assume not.

And I can't remember who it was, but somebody said that NOAA Fisheries' technical staff assisted with the application of climate information to the WaterFix.

Did they incorporate NOAA's sea level rise estimate of 6.6 feet, which is at PCFFA-10?

WITNESS ANDERSON: At what time period does that 6.6-foot estimate refer to?

MR. EICHENBERG: I believe it's 2100, but let's pull up PCFFA-10 --

MR. MUNEVAR: Yeah. It would be good to see the document before the question.

MR. EICHENBERG: -- Page 1 through 2.

Please. Thank you, Mr. Long. Sorry to rush

it.

Page 1 through 2 of this document. Yeah. Yeah, I think. Look at this next page, I think is where it is, actually. There. Yeah, so it's 2100.

Is that -- I guess my initial question was did the NOAA Fisheries technical staff include this in there with their discussions with you?

WITNESS MUNEVAR: I don't believe so.

WITNESS ANDERSON: I believe, as we mentioned, our sea level -- our climate change and sea level rise estimates were derived in 2010, and I believe this is a 2012 report.

MR. EICHENBERG: I see. Thank you.

Let's move on to another topic, just a couple quick questions. Groundwater's been covered, so I just want to make sure I understood your earlier testimony, Ms. Buchholz, that there's been no study of long-term dewatering groundwater impacts specifically from the WaterFix operations; is that right?

WITNESS BUCHHOLZ: I said that there was no additional modeling analysis using CVHM or CVHMD. However, we did do our-- we did do an impact analysis, and that will be presented in the Final EIR/EIS, and it has been summarized in DWR-218.

MR. EICHENBERG: That's not for the WaterFix

operations though, is it?

WITNESS BUCHHOLZ: Yes, that is for the WaterFix.

MR. EICHENBERG: The WaterFix operations, I mean, as specified to this Board, I understood that that was different than what was in the EIR, which has not been released, as we pointed out.

WITNESS BUCHHOLZ: No. I said in the Final EIR/EIS, that impact analysis will be presented, and I summarized it in the Exhibit DWR-218. And that was associated with the California WaterFix.

MR. EICHENBERG: And is that -- if I understand your implication, does that mean that the WaterFix, as presented to this Board, will be the same as the WaterFix in the Final EIR/EIS?

WITNESS BUCHHOLZ: With respect to the -- in this -- I've given this testimony as part of the engineering panel. And that was the purpose of DWR-218 exhibit, was to explain that we had made the change on the use of slurry walls from the exhibits previously presented to -- for this hearing.

MR. EICHENBERG: Sorry. So is the same -- WaterFix is the same presented to this Board and in the Final EIR?

WITNESS BUCHHOLZ: Yes.

MR. EICHENBERG: Yes. Thank you.

And were any environmental effects of the materials used in the grouts and slurry modeled?

WITNESS BUCHHOLZ: When we looked at the -- this is also going to be in the Final EIR/EIS. The materials that we are proposing for use in the slurry walls are consistent with the same materials that are proposed in many other documents, including DWR's well standards that have a mixture of soil, cement, bentonite.

And these are the same, as I said, that were used for drinking water wells for use in well linings to prevent materials to come into the wells for drinking water wells at the different levels.

So we're going to be -- we're proposing in the Final EIR/EIS this same specification that was used in DWR water well standards for that.

MR. EICHENBERG: I thought I heard a "no"; is that right?

WITNESS BUCHHOLZ: No. I didn't answer "no." I was trying to explain. So maybe you can ask the question. I'll give you the "yes" or "no."

MR. EICHENBERG: Thank you so much.

There's been no study of long-term dewatering groundwater impacts specifically for WaterFix

operations?

WITNESS BUCHHOLZ: There has been no modeling on CVHM and CVHMD.

MR. EICHENBERG: Yes. Thank you. Thanks for that clarification. I didn't say that right.

I was -- I asked the wrong question. That's why I didn't say it right.

The environmental effects, there's been no modeling of the environmental effects used -- for the materials used?

WITNESS BUCHHOLZ: We did not do any modeling of the environmental effects because we don't believe there are any environmental effects. That's associated with your previous question on the materials used in the slurry wall installation.

MR. EICHENBERG: Thank you for the correction. I was also confused about the chloride measurements that Mr. Tehrani used because DWR-509 seems to say it's only valid for Rock Slough. We can pull that up. Actually, maybe that would be helpful. There's only one page of DWR-509.

Is it only valid for Rock Slough in the area around Rock Slough? Or is it -- because it seems like you've used -- or we can just ask that question.

WITNESS NADER-TEHRANI: In my analysis, I used

EC-to-chloride, same EC-to-chloride ratios in all the stations that I presented. That includes Rock Slough. I believe I've shown Old River at Clifton Court Forebay, which at times has the same sea water intrusion -- sea water formula, conversion factor.

The place that has -- of all the places that I've shown the EC-to-chloride ratio, Old River Rock Slough has the highest salinity and, therefore, the highest chloride concentrations are expected at that location.

And the point of my -- the plots that I presented are that all of them are lower than the Contra Costa. And, therefore, I'm not too concerned with the use of the formula at other locations simply because the EC-to-chloride conversions -- the EC values at the other locations other than the Contra Costa locations I used are much lower.

MR. EICHENBERG: Could we scroll down a little bit, actually?

WITNESS NADER-TEHRANI: I'm sorry?

MR. EICHENBERG: I'm asking Mr. Long if he could scroll down a little bit.

It says, "The simple linear relationship used for Rock Slough will not work and a quadratic equation is needed."

WITNESS NADER-TEHRANI: That statement applies to Mallard Island, I believe, and that's much further towards the west. That's where you have a lot saltier conditions than you have at Contra Costa Water District.

MR. EICHENBERG: So the use of a different -- or the necessity of the use of a different equation wouldn't change your conclusions about chloride --

WITNESS NADER-TEHRANI: No.

MR. EICHENBERG: -- in other areas of the Bay?

WITNESS NADER-TEHRANI: No.

MR. EICHENBERG: Did you consider using a silver nitrate titration to measure chloride?

WITNESS NADER-TEHRANI: I'm not familiar with that.

And perhaps, Mike, you can also explain the two -- I mean, there is another approach that was used in the EIR.

MR. EICHENBERG: That's not necessary.

WITNESS NADER-TEHRANI: Okay.

MR. EICHENBERG: It's your testimony. If you're not familiar with something, that's fine. Fine for me. Thank you.

MS. RIDDLE: If you could please speak into the microphone, please.

MR. EICHENBERG: So similarly, you measured bromide based on chloride, and this was based on the Rock Slough conversion; is that correct?

WITNESS NADER-TEHRANI: My understanding is that the bromide-to-chloride ratio, actually, it holds true throughout the Delta.

But, Mike, you can perhaps tell me if that statement is incorrect.

WITNESS BRYAN: No. That's also my understanding.

MR. EICHENBERG: Thank you.

So, Mr. Munevar, you mentioned that the Board often uses CalSim II, including as part of its tri-annual reviews of the Bay-Delta.

Can you tell me when the last time CalSim II was used as part of a tri-annual review?

WITNESS MUNEVAR: I cannot, but perhaps the DWR representatives can.

WITNESS REYES: I think CalSim has been used to inform the Board during their Water Quality Control Plan updates.

MR. EICHENBERG: When was the last time there was a tri-annual review?

WITNESS REYES: I'm not familiar with the exact timing of these.

MR. EICHENBERG: But they're not every three years; is that right?

WITNESS REYES: I can't speak to that.

MR. BERLINER: Objection, relevance.

CO-HEARING OFFICER DODUC: He did raise it in his testimony. I think you made your point on this. Move on.

MR. EICHENBERG: He said he doesn't know. That's fine.

WITNESS WHITE: I'm not familiar with the term "tri-annual," but I noticed CalSim was used in the Draft SED.

MR. EICHENBERG: What does SED stand for?

WITNESS WHITE: I think it's Substitute Environmental Document, and I think it was 2013 maybe.

MR. EICHENBERG: Thank you. Thanks for the clarification.

Mr. Tehrani, does the modeling allow you to predict when operators may request a TUCP?

WITNESS NADER-TEHRANI: The TUCP-type operations are not included in the analysis.

MR. EICHENBERG: Thank you.

Mr. Munevar, you state that, under the WaterFix scenarios, long-term average deliveries to South of Delta contractors are identical to the no

action alternative. Are these long-term average deliveries also the same as historical deliveries?

WITNESS MUNEVAR: Can you refer to the --

MR. EICHENBERG: DWR-71, Page 16.

WITNESS MUNEVAR: I think you'll have to refer to which contractors as well. There were several that I commented on.

MR. EICHENBERG: I guess I'm asking what relationship the no action alternative bears for purposes of this section of your testimony to current conditions. Looking at Page 16, Lines 21 through 22.

WITNESS MUNEVAR: So again, my testimony here is -- my testimony here is describing exchange and wildlife refuge Level 2 deliveries, and it is comparing the WaterFix to the no action. It is not comparing to historical.

MR. EICHENBERG: Okay. They're different. Thank you.

WITNESS MUNEVAR: Not comparing to historical deliveries.

MR. EICHENBERG: Okay. Mr. Munevar, you -- looking at DWR-71, Page 8, it's the same document, Page 8. You discussed the conclusions of the 2003 CalSim peer review panel, but you only quoted portions of DWR's response. Why didn't you quote any of the

actual peer review?

WITNESS MUNEVAR: I felt this was the most appropriate description of the model and its use in that validation form, that historic validation run.

MR. EICHENBERG: Did you feel that this peer review validates your findings?

WITNESS MUNEVAR: I'm not certain I understand the question. This was a response to the peer review.

MR. EICHENBERG: Does this peer review validate the CalSim II, the use of CalSim II that you -- as you use it?

WITNESS MUNEVAR: The peer review provided a number of helpful comments. I don't know if it validated or did not validate. I don't believe that was necessarily a conclusion of the peer review.

MR. EICHENBERG: My understanding of peer reviews is that they're supposed to validate the findings of a -- or the usefulness of a procedure or a scientific paper or something like that.

Is that not what this did?

WITNESS MUNEVAR: It is my understanding that the peer reviews in general are not there to validate an outcome of a particular. They are to test various aspects of the model and suggest areas of improvement.

MR. EICHENBERG: Okay. Let's pull up

PCFFA-20, please, Mr. Long. This is the 2003 peer review.

Sorry. It's in my -- on my files that I've given to the Board. Thank you. At Page 9?

CO-HEARING OFFICER DODUC: And you need to identify it for the record.

MR. EICHENBERG: This is the 2003 peer review that Mr. Munevar referred to.

Is this the 2003 peer review that you referred to, Mr. Munevar?

WITNESS MUNEVAR: I referred to DWR's response to the peer review, and I believe this is the correct peer review.

MR. EICHENBERG: Thank you.

So on Page 9, it appears that the peer review is skeptical of running a comparative mode and skeptical of the assumption that model errors do not affect the forecast of change in outcome? Are you familiar with these criticisms?

MR. BERLINER: I'm going to object on the same basis that we had a discussion earlier with Ms. DesJardins. This line of questioning is going to the CalSim model itself, not to the assumptions that were used in the WaterFix.

MR. EICHENBERG: Mr. Munevar mentioned --

CO-HEARING OFFICER DODUC: Hold on. Hold on.

And I'm not familiar with this document, so perhaps you can help me. But from the -- from the heading there under 6.1, it's analyzing the model's capability for comparative results, which is what your witnesses are using this model for.

So as I said before, to the extent that the cross-examination's questioning runs towards the reliability of the model as used by witnesses in presenting evidence to this Board, I will allow it.

So I'm assuming, Mr. Eichenberg, that you are using this to question the comparative analysis being done; is that correct?

MR. EICHENBERG: Of course, I wouldn't dream of doing otherwise.

I believe it was also referred to by Mr. Munevar himself in his testimony.

CO-HEARING OFFICER DODUC: All right. And I will allow him to proceed.

MR. EICHENBERG: Right. So I was asking about the -- whether you're familiar with the criticisms expressed in this section, that running comparative mode -- about running a comparative mode and assumptions that the model errors do not affect the forecast of change in outcome.

WITNESS MUNEVAR: I'm familiar with the highlighted text.

MR. EICHENBERG: And has that been fixed?

WITNESS MUNEVAR: I think as -- if you read the text, it said they have -- they have -- somewhat skeptical, and they're talking about forecast of change. We're not applying the model in a forecast-based operation.

MR. EICHENBERG: It says that no action has been taken based on this peer review, on this section of the peer review in the current modeling?

WITNESS MUNEVAR: I don't understand that question.

MR. EICHENBERG: Have you done anything based on this paragraph in the 2015 modeling that you used for the WaterFix before the Board?

WITNESS MUNEVAR: I think -- I forget the date of this, but it's probably 2000, early 2000s.

MR. EICHENBERG: 2003, yeah.

WITNESS MUNEVAR: 2003. So a number of changes since 2003 have occurred in the model to better represent historical operations or operational decisions, and those have all occurred between -- since '03 to 2010 for the models that are used in this WaterFix.

MR. EICHENBERG: You believe that the models -- that the panelists' skepticism would no longer be well founded?

WITNESS MUNEVAR: I won't speak for the panel.

MR. EICHENBERG: And you feel that the errors -- the model errors no longer render an absolute forecast unreliable, or is that separate from what --

WITNESS ANDERSON: But we're not doing an absolute forecast. This paragraph suggested exactly the way we're using the models. It says that the models might not generate a highly reliable, absolute prediction, but -- and you skip down, like, two lines. It says it's a reasonably reliable estimate of the relative change in outcomes which is the comparative kind of analysis. So --

MR. EICHENBERG: Well, it says the model -- the panel is skeptical of this notion.

WITNESS ANDERSON: It says -- the "skeptical" comes before the -- where it's talking about forecasts.

MR. EICHENBERG: You said it might produce a reasonably reliable estimate of the relative change in outcome, "The panel is somewhat skeptical of this notion."

MR. BERLINER: I'm going to object to this interpretation of the document. The document has plain

language in it that can be read and should not be reinterpreted by the questioner.

CO-HEARING OFFICER DODUC: Actually, I'm very interested in this paragraph, and I wish to understand it better.

MR. BERLINER: And I think that's fair to ask the experts that question.

CO-HEARING OFFICER DODUC: Hold on. Then someone, Ms. Anderson or Mr. Munevar, someone explain to me, at least from your understanding, is this paragraph suggesting that the panel is questioning the use of CalSim for comparative results?

WITNESS MUNEVAR: No. That is not my understanding.

CO-HEARING OFFICER DODUC: So when the statement that says, "The panel is somewhat skeptical of this notion," how do you interpret -- what does that -- what do you believe they were referring to when they say they are "skeptical of this notion"? What notion is that?

WITNESS MUNEVAR: I think this section probably needs to be read in a broader context here. There's a following paragraph that is talking about the need for the model potentially to be used in an -- or a need for models to be used in an absolute predictive

sense.

CO-HEARING OFFICER DODUC: Can we scroll down, please.

So where are you referring to?

WITNESS MUNEVAR: In the first and second sentence of the following paragraph, the last paragraph. That paragraph talks about a need, a user need for absolute predictions. That is not how we are applying it in this particular context.

CO-HEARING OFFICER DODUC: Okay. I need -- okay. Let's go back.

I'm sorry for taking over your cross-examination here, Mr. Eichenberg.

I'm looking at the sentence that reads, "The panel is somewhat skeptical of this notion," blah, blah, blah, because it relies on the assumption that model errors which render -- focus on that sentence.

The way that I read it, it seems to imply that they are questioning the use of the model for comparative results, which I think was what Mr. Eichenberg was leaning towards.

Correct me if I'm wrong.

MR. EICHENBERG: I was curious about that, yes. Thank you for clarifying.

WITNESS MUNEVAR: So I've lost the question

now.

CO-HEARING OFFICER DODUC: So read the sentence, "The panel is somewhat skeptical." Read the entire sentence. You don't have to read it out loud.

They seem to say that there's -- the errors that makes a prediction unreliable are not independent enough that it would not similarly affect comparative analysis. At least that's the way I read it.

WITNESS MUNEVAR: So, like, I can give you only my best representation --

CO-HEARING OFFICER DODUC: Please.

WITNESS MUNEVAR: -- of what this is.

Virtually all modeling is done with a base case and a comparative mode. I believe -- without trying to interpret the minds of the panel members here, I believe what they are suggesting is that you would like to have the most accurate of the base model such that, when you do comparisons, the changes are most representative.

The basis of all modeling not just for DWR but in general is based on applying a change and evaluating the effects of that change compared to a run without that change. And that is the basis of comparative analysis. I can't speak to why the panel would be skeptical of that notion.

CO-HEARING OFFICER DODUC: But you disagree, then?

WITNESS MUNEVAR: I can't say I -- I believe what they're saying is the changes may -- that the comparative changes -- let me -- sorry. Let me try this again.

They're comparing two different versions here. They're comparing an absolute prediction, and then they're saying in comparative analyses, if you had a different absolute prediction, would the changes be different if you had a different absolute prediction. That's my understanding of what they're talking about.

And my belief is that, for the purposes of the WaterFix here, the changes would not be different or substantially different if you had a different -- what we call an "absolute." But again, we're not doing an absolute. We're doing a no action at 2030.

So I'm not sure I can respond better than that without getting into the minds of the panel members who wrote this.

CO-HEARING OFFICER DODUC: I think that's the best you're going to get, Mr. Eichenberg.

MR. EICHENBERG: Yeah, it does seem that way. And especially without getting into the -- questioning the base assumption of CalSim, which I won't do.

CO-HEARING OFFICER DODUC: Actually, now I'm curious. What would you ask?

MR. EICHENBERG: I didn't have much more on this anyway, but the -- I think that this is asking -- this is saying they are skeptical of the idea of a comparative analysis without some sort of historic validation.

And I think that goes back to what was objected to in Ms. DesJardins's cross, which was questioning whether -- how the model -- how the early modeling or the basis modeling had been calibrated and validated, and whether they compared to historical averages at some point, whether those historical averages supported the use of the model for predicting future events.

And I think that the -- that this panel, this review is expressing skepticism. So I guess I would ask, is there any basis to that skepticism of a model being run in comparative mode without any historical validation?

CO-HEARING OFFICER DODUC: Your response to that?

MR. EICHENBERG: I just want to point out that I believe in response to this at the same time there was a historical validation prepared by DWR which

covered the period of '87 to '92, I believe; the historic period of '87 to '92 in which the model was run in a kind of quasi historical mode.

And those are the values that I reported in my testimony in which the flows into the Delta and out of the Delta were on the order of a couple percent difference from historic, and the deliveries I believe were on the order of 4 or 5 percent of historic.

CO-HEARING OFFICER DODUC: Was that announcement made available to Mr. Eichenberg and other parties?

WITNESS MUNEVAR: It was part of my testimony. Yes.

MR. EICHENBERG: So Ms. DesJardins I think was trying to question the accuracy of that historical model. That was my understanding of where her testimony was going, so I didn't want to go down the same road.

CO-HEARING OFFICER DODUC: Well, we might -- you know what? We might have to revisit that with her, but since you've raised the issue and questioned the use of the model for comparative purposes, which is what Petitioners are proposing, I'll grant you some leeway with that, if you focus on the model and the basis of the model for the use of comparative purposes.

MR. EICHENBERG: Right. I understand. I didn't prepare more detailed questions.

CO-HEARING OFFICER DODUC: All right.

MR. EICHENBERG: I was planning on going after Ms. DesJardins, and I may have been able to follow up at that time, but as I said, she's much more knowledgeable about some of these modeling questions. And I think we've seen what attorneys can do with modeling information and how confusing it gets. I didn't want to go down through the same.

CO-HEARING OFFICER DODUC: All right. Well, we will get back to Ms. DesJardins, but since she's standing up there, I'll just again say that, for the purpose of questioning the use of the model and the reliability of the model, the way the petitioners have used it for comparative purposes, that is perfectly relevant. Okay?

MS. DES JARDINS: Okay.

CO-HEARING OFFICER DODUC: Mr. Eichenberg.

MR. EICHENBERG: And I have so little time left. I just had a couple quick questions I'm going to try to fit in, but maybe I'll get a little extra leeway with the caveat that you can cut me off if you think anything I'm asking about is not helpful.

That's all I really want to do right now. At

this point I've asked most of the other questions.

So you also say that the model was peer -- Mr. Munevar, you also say that the model was peer reviewed as part of its publication, but I saw that your name was in the author credits.

So did you peer review your own model? Does that count as peer review?

WITNESS MUNEVAR: No, but it was -- no, that does not count as peer review. It was published -- it was published in a peer-reviewed journal that reviewed the paper, and that's what I was referring to in terms of -- in terms of the peer review.

MR. EICHENBERG: I might move to strike that portion of Mr. Munevar's testimony because it -- I find it misleading when he says that -- to me it looked like he was saying that the model had been peer reviewed by his own article, and he just said that that doesn't count as a peer review.

So on that basis, I would move to strike that portion of his testimony.

CO-HEARING OFFICER DODUC: Please clarify, Mr. Munevar.

WITNESS MUNEVAR: Yeah, that was not what I said. I said that the paper that was published by myself and co-authors was published in peer-reviewed

journal in which there's a process in which they review the paper independent of the authors of the paper.

CO-HEARING OFFICER DODUC: But it wasn't on its own a peer review of CalSim?

WITNESS MUNEVAR: I believe there are other peer reviews that are included here that are other reviews of CalSim.

CO-HEARING OFFICER DODUC: Thank you.

MR. EICHENBERG: Right. Your testimony says, "CalSim II has been peer reviewed as part of the publication of the model," and then you list yourself as an author of that peer review. That's what I would move to strike. That's Page 8, Line 22 through 25.

WITNESS MUNEVAR: I think this is a very common practice in science. You develop science, you put it through a peer-reviewed publication, expert reviewers review it, provide comment, and the papers are revised. This is how science works.

CO-HEARING OFFICER DODUC: Thank you. We have Mr. Eichenberg's objection. We have Mr. Munevar's response on record. We'll take it under advisement.

Move on, Mr. Eichenberg.

MR. EICHENBERG: Your opinion, you said something about quasi validation.

Is that as effective as full validation?

WITNESS MUNEVAR: I think the term "quasi validation" was because portions of the model were validated as opposed to all of it, which could not be validated.

MR. EICHENBERG: Okay. Thanks.

Then, as far as access to data, what format do you usually review the modeling data in? Do you review the raw data?

WITNESS MUNEVAR: Is the question to me?

MR. EICHENBERG: Yes.

WITNESS MUNEVAR: I review the results in terms of their output DSS. There's files that are in a format called DSS, and the utilities I believe that Ms. Anderson or Ms. Smith had presented yesterday are the same utilities that we commonly use.

MR. EICHENBERG: So you usually look at graphs and plots, and you don't look at just a sheet full of data, usually?

WITNESS MUNEVAR: It depends. Oftentimes we look at every single month of the output in a tabular format, sometimes graphical.

MR. EICHENBERG: And that's true for everybody on the panel, I assume? Yes?

Ms. White?

WITNESS WHITE: Me personally, when I look at

CalSim outputs, I usually open the DSS file. I scroll through, looking at particular variables, looking at particular months, years, whatever. And then from there, I might pull out and create a graph or use the DSS view function to create a graph.

MR. EICHENBERG: Thank you.

And how long did it take you to do all of your WaterFix evaluation based on that modeling you had?

MR. BERLINER: I'm going to object on the grounds of relevancy.

The tasks that data modelers go through --

CO-HEARING OFFICER DODUC: One at a time.

Mr. Berliner.

MR. BERLINER: The tasks that modelers go through to do their work seems to me very generic and really not relevant to the questions we're trying to answer here today.

CO-HEARING OFFICER DODUC: Mr. Eichenberg.

MR. EICHENBERG: The data has been presented as evidence by DWR, and the implication has been made that protestants can go and look up that data and form their own conclusions based on that data.

So I'm trying to establish -- but I think it's a very difficult process. It's not something that I'm really prepared to do, and I think it takes a number of

hours, and it's very --

CO-HEARING OFFICER DODUC: You don't need to testify to that.

Please answer the question.

MR. EICHENBERG: Sure. Yeah.

Ms. White. Thanks.

WITNESS WHITE: I think usually it's not a "sit down and review the whole model" task. It's usually more of a -- start by looking at some general outcomes, then dig in. So I guess it would depend on what we're looking at.

I mean, there are -- we may start looking at some of the outputs in the model. Maybe that would take a few hours or a few days, depending on what we're looking at, but then as questions come up, we might look into more detail. And that more detailed look may be ten minutes, may be hours. I think it just depends.

In general this has been a long, long process. So I think we've looked at models throughout the course of this entire proceeding, not just this hearing but the whole BDCP proceeding.

WITNESS NADER-TEHRANI: I might add one thing. This is Parviz Nader-Tehrani.

The biggest time we've spent on is making sure the numbers are accurate to the best of our ability.

So we do spend a lot of time looking at, for example in my case, water quality, water levels in different formats, different graphs. But a lot of that is just to make that the information that is being presented is accurate.

CO-HEARING OFFICER DODUC: Thank you.

MR. EICHENBERG: So if I wanted to also make sure that your numbers were accurate and the modeling was accurate, I would have to -- that would be the biggest amount of time that I would have to spend, and that would probably mirror the amount of time -- well --

CO-HEARING OFFICER DODUC: Mr. Eichenberg, I think you've made your point on this, as have other cross-examiners yesterday.

MR. EICHENBERG: PCFF- -- can I pull up PCFFA-21?

CO-HEARING OFFICER DODUC: Is this your last question?

MR. EICHENBERG: It can be.

CO-HEARING OFFICER DODUC: Let's see what it is.

MR. EICHENBERG: Sure. I'm not entirely certain. I'm hoping that Mr. Reyes can say something about it, but if not, then we can skip it.

CO-HEARING OFFICER DODUC: Identify what this is for the record, please.

MR. EICHENBERG: I'm not entirely certain. I found it on DWR's website, and it said it was authored by Eric Reyes.

Is this something you're familiar with, Mr. Reyes?

WITNESS REYES I'm familiar this type of spreadsheet, but I don't believe I created this spreadsheet.

MR. EICHENBERG: Could you have produced a spreadsheet like this for the modeling data that was provided in pure data format?

MR. MIZELL: Objection as to relevance.

We have no idea what this spreadsheet is used for and how it relates to the California WaterFix at this time. It's something he found randomly on the Web, as the questioner stated. I don't see how it's relevant.

CO-HEARING OFFICER DODUC: Mr. Eichenberg?

MR. EICHENBERG: Can I ask a question?

What is this spreadsheet used for and what relevance does it have to the WaterFix data if you were to use a spreadsheet like this?

CO-HEARING OFFICER DODUC: Mr. Eichenberg,

what is this spreadsheet? I need to understand it. Just because you found it on the DWR website, what is it and why are you asking Mr. Reyes this question?

MR. EICHENBERG: I believe it's a spreadsheet that you can input data from CalSim II into and it will produce graphs of different impacts and outcomes. And I think it's the type of spreadsheet that DWR might use when it's making decisions.

CO-HEARING OFFICER DODUC: I'm sorry. Did you generate this spreadsheet?

MR. EICHENBERG: I did not generate this spreadsheet, no. The author credit on DWR's website said it was Mr. Reyes, but I'm not certain.

CO-HEARING OFFICER DODUC: Mr. Reyes, do you recognize this?

WITNESS REYES: I mean, I recognize this type of spreadsheet. Whether it's -- I don't know what he means by "the author." I know on Excel and Word type products, you sometimes have an author, and it'll be your name. So if I sent someone a spreadsheet that I originally created and someone modified it, it would still have my name as the author. I don't know if it means I created this spreadsheet.

However, this does look familiar. I mean, this is the type of spreadsheet that has been used in

the past to evaluate different calcium outputs.

MR. EICHENBERG: So this type of spreadsheet that has been used in the past to evaluate different calcium outputs, could it have been produced for protestants to go along with the data that was provided?

MR. BERLINER: Objection as to relevance.

MR. EICHENBERG: It would have made it a lot easier to understand the data if we could have used the same spreadsheets that they used.

MR. MIZELL: Again, objection as to relevance. We put on a case in chief in a manner we thought was informative to the public. Whether or not it achieves that purpose is for the Board to decide.

And I don't understand the relevance of whether Mr. Eichenberg does or does not understand the spreadsheet or any other extraneous work.

CO-HEARING OFFICER DODUC: Is the spreadsheet -- is the tool that used to the spreadsheet similarly available to other parties?

WITNESS REYES: That, I'm not aware of. I mean, it's -- I don't see any reason why we wouldn't share this type of information sometimes, but these spreadsheets, I mean, there's some -- just like with DSS, there's some user knowledge that you need to even

operate these spreadsheets. So similar to the DSS view that's publicly available. I mean, it's --

CO-HEARING OFFICER DODUC: All right. I think we'll to have leave it at that, Mr. Eichenberg.

MR. EICHENBERG: That's fine, yeah. And I think we can be done there. Thank you so much for your generosity.

CO-HEARING OFFICER DODUC: Thank you. I think you helped clarify a bit of confusion for me as well as perhaps Ms. DesJardins with respect to the whole modeling questions or line of questioning that she will be pursuing. So that was helpful.

MR. EICHENBERG: Thank you.

CO-HEARING OFFICER DODUC: I see Mr. Porgans in the audience, and I know he has not been feeling well, and I don't want to have him come back after lunch to do his cross-examination.

So just to check off my list, Group No. 39, I don't see Ms. Daly here, but just to make sure. All right. So we're now up to Mr. Porgans.

Yes, Mr. Brodsky is here, but he has asked to go last. Well, at least he's now second to last because we've also put Ms. DesJardins towards the end.

(Inaudible, unidentified speaker)

CO-HEARING OFFICER DODUC: Well, no. We have

Ms. Suard, Ms. Womack.

MR. PORGANS: Co-chairman Doduc, could I give this to the petitioner? This is my exhibits. I wanted to give it to them.

CO-HEARING OFFICER DODUC: Yes, please give it to them, and then we'll also have to identify it for the record.

MR. PORGANS: Thank you so much.

MR. OCHENDUSZKO: And as we have a short interlude here, I wanted to remind Dr. Nader-Tehrani and Mr. Munevar to please move a little bit closer to the microphone. Thank you very much. Or move the microphone closer to you. Thank you.

MR. MIZELL: And so that we don't end up with any confusion on the exhibits that were handed out, will Mr. Porgans need that binder back at the end of his questioning?

MR. PORGANS: Thank you very much. And I want to thank the staff and DWR and your staff for the help that you provided to me. It was very compassionate. I appreciate that.

CO-HEARING OFFICER DODUC: Mr. Porgans, Mr. Mizell's question is will you need this exhibit back?

MR. PORGANS: Not necessarily. You can have

it. Those exhibits will be up there too for everyone's review.

CROSS-EXAMINATION BY MR. PORGANS

MR. PORGANS: My name is Patrick Porgans. I'm representing Planetary Solutionaries. And I want to talk about three things today. I want to talk about the genesis of the model and how the model got to where we are. And you don't have to go into great detail, but just briefly that's what I need them to do.

And then I want to look at the effectiveness of the model in terms of the application for the designated purpose, you know, and that's comparative, according to CalSim II, Exhibit DWR, Exhibit 4 on Page 7.

Could we bring that up? Is that okay to bring that up?

MS. RIDDLE: DWR-4, Page 7?

MR. LONG: Excuse me. DWR-4 or DWR-4E?

MR. PORGANS: I believe it's in the DWR-4, on the modeling. This is the one I'm looking for.

MS. RIDDLE: I think the original.

MS. McCUE} Oh, really?

MS. RIDDLE: Does one not have the page numbers on it? He has the ones with the page numbers, so perhaps that is the right one.

MR. PORGANS: This one here starts off on Page 7. It's CalSim II. It says, "CalSim II simulates long-term operational scenarios of the State Water Project and the CVP."

MS. RIDDLE: So it must be the other one.

MR. LONG: This is DWR-4 not 4E?

MR. PORGANS: It's 4, yeah, 4, and it's Page 7, I believe. And it's modeling. It's not operations. Unless I have the wrong exhibit, but I doubt it. I only have extra of this document. I don't have the whole document with me.

MS. RIDDLE: The modeling PowerPoint, please.

MR. LONG: I'm opening 5E.

MS. RIDDLE: Page 7. No, it's the other one. Or, no -- that's it. Okay. Sorry.

MR. PORGANS: I think that this exhibit explanation what this CalSim is about -- excuse me. It's about -- it is me most appropriately used for comparative purposes and not for predictive purposes; is that correct? Is that what it says?

WITNESS MUNEVAR: That's correct.

MR. PORGANS: Okay. So we got that part of the discussion straightened out. Now going back to CalSim II, I'd like somebody to explain to me how we got to where we are with CalSim II because there's some

questions that were raised today that affects my confidence in the model, in the model itself.

So how did we get to -- we had CalSim I; then we went to CalSim II. Can you tell me a little bit about that, how that morphed into II?

WITNESS REYES: Yeah. CalSim II was an undertaking by DWR and Reclamation to provide a -- I guess more detail into the spacial scale and resolution of the model in comparison to CalSim I and its predecessor DWR Sim.

MR. PORGANS: And then that also is partly to do with the COA, the Coordinating Operating Agreement was fitted into that on the CalSim II, was it? Has it morphed or not?

WITNESS REYES: I believe so. I believe it was a part of DWR Sim and CalSim I also.

MR. PORGANS: Okay. And so the model itself has been generated for the most part by DWR, the Bureau, and who else was involved in that?

WITNESS REYES: Those are the two agencies that lead that effort since it's representative of our two projects.

MR. PORGANS: So we're basically, then, depending upon a model that was generated by the Department and the Bureau for the purposes of operating

-- or getting a better understanding of the operation of the project; is that correct?

WITNESS REYES: That's correct.

MR. PORGANS: So if I look back and I asked you, you know, what was the intended purpose of the model, was the model designed to help better meet the requirements of this standard? Was it there just to give us some simulations as to what it could be? Because we're dealing with a model that's based on assumptions.

So my question is, is that looking at the model itself in terms of the long-range use of it, how effective has the model been in terms of looking at the Delta as it exists today, the so-called crisis in the Delta? Which I'll put that up here as an exhibit in a minute. How did that work?

MR. BERLINER: I'm going to object on the grounds that the question is vague and ambiguous.

Perhaps Mr. Porgans could just succinctly state his question for the panel.

MR. PORGANS: Thank you. Yeah.

So if you look back at CalSim I, CalSim II, how effective has it been in realizing your objectives and for sustaining the water needs of everybody in this equation?

WITNESS REYES: CalSim in its various forms is a long-term planning tool used by the Department and Reclamation to evaluate projects in a long-term basis. It's -- and that's its purpose, I guess I should say.

CO-HEARING OFFICER DODUC: How long have you been using CalSim?

WITNESS REYES: I think CalSim has been in existence since about 1998.

CO-HEARING OFFICER DODUC: Since 1998, have you -- have you evaluated how well CalSim has served as a planning tool for the Department?

WITNESS REYES: I guess I don't understand the program parameters of that question. How well it's served? It's the best available tool that we have to conduct long-term planning and, you know, we constantly try to improve it and make sure it does a better job of training the system and system effects in operations.

We often consult with our operators to make sure that we get it tuned in as best we can for this type of long-term planning tool that's just meant to be an informative tool for decision makers.

CO-HEARING OFFICER DODUC: Okay. Mr. Porgans.

MR. PORGANS: I think you partially answered the question, but the question comes back to, have you gone back and actually looked at, reviewed it to

determine or ascertain how beneficial it has been? That's what I'm asking you.

I mean, I understand what you're saying, but I'm just asking that question. If you can't answer, it's fine.

CO-HEARING OFFICER DODUC: Mr. Porgans, I think there's a challenge here in that the Department and the Bureau, for that matter, have stated repeatedly as on the slide here that it's not for predictive purposes. So when you ask them to go back and -- it sounds like what you're asking is for them to come back and compare it to actual historical data which they have said is not something the tool is intended for.

So what specifically are you asking them? How are you specifically asking them to evaluate the model?

MR. PORGANS: Well, if I go to -- if we go to my Exhibit No. 2 -- I believe it's No. 2. Let me see here. Yeah, excuse me. It's 100-M.

I did -- I took the advice -- this is just a point of clarification. I took the advice of staff and I renumbered some of my exhibits to 100, 102 and so forth. And each one of these will come back to you in an individual file. I'm sorry about this, the way I put it together.

However, if you look at -- go back up to that

-- the Delta conservation plan, California WaterFix on that. Can you go up a couple of pages?

CO-HEARING OFFICER DODUC: I think we're at the top. Scroll up.

MR. PORGANS: Yeah. I think we have to come down.

CO-HEARING OFFICER DODUC: Down?

MR. PORGANS: Please.

CO-HEARING OFFICER DODUC: Go down?

MR. PORGANS: We're coming to this picture. We're being looking for this picture here.

MS. RIDDLE: There's a picture of a water drop. Can you scroll down to that?

MR. PORGANS: It's about four pages down. There it is. Okay. Go to the next page there. It's highlighted, and we're looking at -- I believe it's Line 15.

MS. RIDDLE: Keep going, next page.

MR. PORGANS: We got to go back. I'm sorry. Go back, please. It's right after the page with the picture of the fix. Okay. There's that.

So let's come down one page; see what happens there. Could you go the other way, please? Could you come back this way? Yeah. Next page. Keep going. Keep going.

See, what happened here, just so we understand, I converted this file from one format to another so when it went into a pdf, it jumped around.

Can you keep going down? A couple more pages. No. That's -- I'm going to have to do this. I did give the petitioners a copy. I'm sorry that it's not showing up up there.

But if I can give this to Ms. Riddle, she can read what it says here on the second paragraph.

MS. RIDDLE: "Unfortunately, the Delta is in a state of crisis. Several threatened and endangered species, including Delta smelt and winter-run Chinook salmon have recently experienced the lowest population numbers in recorded history. Meanwhile, Delta levees and infrastructures they protect are at risk of earthquakes, damage due to continued land subsidence and rising sea levels."

MR. PORGANS: Thank you.

So do we agree with that general comment there? It's in DWR's publication. Anybody on the panel, do we agree with the concept that we have a crisis in the Delta?

WITNESS BUCHHOLZ: I believe that you're referring to the second paragraph of the Executive Summary of the Recirculated Draft EIR, Supplemental

Draft EIS; am I correct?

MR. PORGANS: I believe that's correct. Yeah. It's the Bay-Delta Conservation Plan, California WaterFix, Partially Recirculated Draft EIR/EIS I.

WITNESS BUCHHOLZ: That is in our executive summary for the Recirculated Draft EIS. It's part of the background and context for the project.

MR. PORGANS: So that's my question. I'm asking because I'm trying to establish some foundation to this, and I'm trying to find out if, for example, we knew that we have a condition that exists. And I'm asking how models -- if these models help up to try to identify these things before they happen. How does the -- does the model even do that? That's my question. What does the model do to help avoid a crisis?

WITNESS MUNEVAR: So I'll try to answer the best I can.

In terms of -- the model is not trying to predict the outcomes of a crisis or used in a predictive sense. But going back to the previous, the question was many of the actions that we -- that the fishery agencies have implemented to achieve improved biological conditions or fishery conditions are tested out in the model far in advance of actually being implemented to understand how effective they could be

in the future.

So I think that is a very large value of the models as they're used in that comparative sense.

MR. PORGANS: That's all I'm trying to do. I'm not trying to make a prediction here. I'm just asking. You know, we have baseline information. We should be able to use that documentation in some respect. That's what I'm asking you.

So have we been able to utilize the historical knowledge without putting it into a prediction to get a better understanding of how we can bring that Delta back into homeostasis?

WITNESS MUNEVAR: Well, without going to the homeostasis part, we have used the models in particular for the NMFS and Fish and Wildlife biological opinions have informed how operations, system operations could be altered or the limits of those operations to achieve improved biological outcomes.

MR. PORGANS: And I appreciate that. But if we look -- and I'm not getting involved in the Endangered Species Act. That's not what you guys do. I'm just looking at numbers, and numbers tell me that there's declines going on, and all of the effort that's been made thus far doesn't appear to have a handle on it. So my question was does your models help us get

there to where we can all have some assurances that the information we have is going to be used for the purpose of providing solutions? Excuse me.

WITNESS BUCHHOLZ: I'm going to try to answer this question without reference to either an environmental document or an Endangered Species Act document. There are several dozen models that are used by the agencies in all of these different analysis, whether they're in formal NEPA, CEQA or just trying to come up with an alternative to an operational concept that would improve the state of the environment and water supply.

CalSim II is one of those models. We use -- we test out hypotheses using CalSim II. And what can we -- let's say we're going to change -- some people say, well, what if we change the operation this way? We can use CalSim II to come up with the result in change in hydrology, Delta outflow.

We use that going into other models like DSM2. What does that do for water quality? And the same thing, then; we go down into fisheries models which will be part of Part 2.

When we look -- I think what your question is, is has we ever looked backwards and said, "We previously did studies. We thought this was going to

work. Our observations 10 or 20 years later have shown that other situations have occurred."

When we start this project and we started other projects, we first have to come back and say, well, what assumptions did we make back 10 or 20 years ago, and what changed that had nothing to do with the modeling but other environmental factors that changed, and why did those -- and how did that affect the environmental resources such as sea level rise or such as different weather or such as new discharges or new diversions?

All of those things react, and we only had so many -- when you do a model, we have a set of assumptions. There are many other items that occur in the time frame before the next set of analysis that could affect environmental conditions. Do we look at those? Yes. Is it the factor of the models? No, because the model doesn't have perfect foresight of other conditions that would occur in the environment.

So that's why we're not saying it's the models' fault or responsibility. It's just part of the way we have to go forward and analyze new situations.

I don't know if that helps.

CO-HEARING OFFICER DODUC: Thank you.

MR. PORGANS: Thank you. That was a very good

explanation. I appreciate that. It helps a little bit.

Now, what I'm going to ask you and, you know, I'm not trying to offend anyone here. Now, most of you modelers, are you familiar with Jay Lund over there at the University of California Davis? Are you familiar with Professor George Box out of Wisconsin?

I have some articles here I'm going to put up -- exhibits. If you can put up Exhibit Porgans 100-M. It's an article -- it's on the Insights for California Water Policies for Computing Models -- Modeling. And I don't know if you can see that up there, but it says all models are wrong. Some are useful.

I mean, are we in agreement with that or what?

WITNESS SMITH: Yes.

MR. PORGANS: Thank you.

So what I'm trying to say to you here, I'm trying to get at how we can then -- if we know that we are putting assumptions into the model and we're putting numbers into the model, the output is somewhat based on the input, you know, in terms of what we're going to get back out of that.

Now, when you say that CalSim II was partially peer reviewed, I don't know what that means. "Peer

review" to me means peer review of everything, you know, that all of your numbers, everything that goes into that model is something you have to look at, from my point of view.

So what I'm saying is that how -- how is it that we have these models, we have these assumptions, and then as we go forward, we try to adapt to what the assumption may not have worked out to, and then we try to make those tweaks in the model to get us to do what? Improve it? Meet the standard?

MR. BERLINER: I'm going to object on the grounds of vagueness and ambiguity. I don't know understand the question.

CO-HEARING OFFICER DODUC: I'm not -- I would say that I don't understand the question either.

MR. PORGANS: Okay. Let me try to simplify it. If DWR and the Bureau are involved in the modeling and they're the ones that are promoting the model, we got to have somebody outside of DWR to look at this model -- that's what my point is -- I mean, just for your own sake.

So I want to know if you have ever had CalSim independently peer reviewed outside of your Department or outside of the Bureau?

WITNESS REYES: Yes. In 2003 we had a peer

review of the CalSim model.

MR. PORGANS: By whom?

WITNESS REYES: Jay Lund was one of the reviewers on that panel.

MR. PORGANS: I have to take a noted exception to Mr. Lund because he's also -- he works -- he did the contracts with the Department of Water Resources.

CO-HEARING OFFICER DODUC: Mr. Porgans. Okay.

MR. PORGANS: Sorry about that --

CO-HEARING OFFICER DODUC: No, no, no. Hold on. Hold on.

I've allowed you some leeway to lay this foundation, but now I need you to direct your questions of these witnesses to the specific modeling that they performed. Can you go there?

MR. PORGANS: Yeah, I'll go there. Thank you.

CO-HEARING OFFICER DODUC: Please go there.

MR. PORGANS: So you had a 2003 peer review by Jay Lund and others. And could you give us a synopsis of what the outcome of that was?

MR. BERLINER: I'm going to object to the question. That seems directly contrary to the direction you just gave.

CO-HEARING OFFICER DODUC: And how -- link for me how this is relevant to any specific outcome of the

modeling that you want to question? Is there a specific modeling outcome that you want to question these witnesses on?

MR. PORGANS: Well, where I'm going with this is if -- the question I would have is if we look back at the models, how effective are they?

CO-HEARING OFFICER DODUC: Are you able to answer that question? I think we tried before.

WITNESS MUNEVAR: I'll try to give a very succinct response to it.

The validation that was done in 2003 and the response to the peer review that was -- DWR presented in 2004 are the responses due to the peer reviews. For the DSM2 model, it has been recalibrated as part of this effort for the California WaterFix, and that's documents in the Draft EIR/EIS.

CO-HEARING OFFICER DODUC: Sitting here today, what is your level of confidence in the use of these models for planning the purposes that went into this petition. Are there any other tools that could be used? Are there many any additional verification of these models that might be useful?

WITNESS MUNEVAR: I think the tools that are used are the best available tools. There is a substantial -- without going into the details, there is

a substantial amount of input from hydrologists, operators, fishery agencies that govern the way these -- the CalSim model in particular runs that is unparalleled in other models that exist right now.

CO-HEARING OFFICER DODUC: So in your opinion -- and others may disagree, but in your opinion and your expertise with these models, are there any fatal flaws in assumptions or basic modeling parameters that you would want to revise?

WITNESS MUNEVAR: Was that the end?

CO-HEARING OFFICER DODUC: Yes.

WITNESS MUNEVAR: No, no.

CO-HEARING OFFICER DODUC: So you're confident in the tools that you have used and confident in the result that came from those tools in presenting your petitions to the Board?

WITNESS MUNEVAR: I am confident in the tools that were used and the application of the models for the purpose of WaterFix in terms of comparative -- comparative evaluation.

CO-HEARING OFFICER DODUC: Yes, for comparative evaluations.

Mr. Porgans.

MR. PORGANS: Great. Anyway, moving along, then, I want to go back and focus in on -- you said

CalSim II, you came back in 2010? Was it 2010 you just said? I'm sorry. CalSim II was redone in 2010; is that what you said?

WITNESS REYES: I believe Mr. Munevar said that in 2004 there was a response to the peer review. In other words, we tried to address issues that were raised in the peer review, and we also had our own takes on some of these recommendations.

And then from 2004 to 2010, we periodically update our model with any new information or any updates in operations, regulations. Any errors, if we find them, we try to correct. And in 2010 there was a process called the "common assumptions process" where we tried to incorporate a bunch of these changes and update the model.

MR. PORGANS: So the idea -- the CalSim II, then, that was updated in 2010, did you -- are you saying you applied that to the California WaterFix or not?

WITNESS REYES: Initially it was applied to BDCP. For California WaterFix in terms of what we're presenting for the hearings, it's a 2015 version of that model.

MR. PORGANS: And is that CalSim II, or it CalSim III?

WITNESS REYES: CalSim II.

MR. PORGANS: Do you have a CalSim III?

MR. REYES: No. We don't have a completed CalSim III model.

MR. PORGANS: But you are working on a CalSim III?

WITNESS REYES: It's under research and development. Yes.

MR. PORGANS: How long has it been under research?

WITNESS REYES: I think it started back in 2006, I believe.

MR. PORGANS: And the status of when it's going to be completed, if we can apply it to this particular project? Or is that not necessary?

WITNESS REYES: I don't believe it's necessary for this project. CalSim III, the development of it is similar to what I've stated about CalSim in general, is that we're constantly trying to improve the model to better represent the system in our projects. But that model is not ready for use yet.

MR. PORGANS: Okay. So we want to go back into the DSM2, and we want to look at the -- you took a 16-year window there.

Let me see if I can come back up here. Oh,

excuse me. I'm sorry. I want to go to the next exhibit, please. That would be -- I think it's Porgans 102.

CO-HEARING OFFICER DODUC: Mr. Porgans, with all the cross-examiners today, I've asked them to provide me a list of topic areas that they'll be covering. I forgot to do that with you.

What are the topics that you are exploring?

MR. PORGANS: I thought I mentioned it to begin with. I mentioned that I was going to look at the genesis of the model, how we got to where we are now, which they did.

CO-HEARING OFFICER DODUC: But I think we've done that. So I'd like you to move on from that.

MR. PORGANS: I'm done with that.

CO-HEARING OFFICER DODUC: Okay.

MR. PORGANS: And then we're moving toward -- we're trying to find out how much confidence we can put in the model, you know, based on what they said because, you know --

CO-HEARING OFFICER DODUC: And I think we've asked them that question as well.

MR. PORGANS: That's fine. And so now we're moving toward -- or we're looking at the 16-year interval, you know, for the DSM2.

CO-HEARING OFFICER DODUC: Okay.

MR. PORGANS: And they picked the period between 19- -- I believe it was '80 -- excuse me. Hold on.

Could you bring that down, another one? I've got the information up there.

CO-HEARING OFFICER DODUC: All right.

During that, what other topics after 16-year interval?

MR. PORGANS: Then we're going to look at the overall condition of the Delta in regards to what they're proposing. And we have to remember something, and I want to clear this up so we understand. If I'm out of order, you tell me.

I rely on these people to give me information so I can make determinations about public trust issues. Okay? As far as I'm concerned, you know, they're modelers, and we put assumptions and all the rest of that stuff in there. And, yes, we don't make predictions, but we do see the result of what has not happened. And what has not happened is the Delta is not in good shape. It's in crisis.

CO-HEARING OFFICER DODUC: All right. You're not testifying here.

MR. PORGANS: Okay.

CO-HEARING OFFICER DODUC: So conditions of the Delta. What other topics?

MR. PORGANS: Hold on here.

CO-HEARING OFFICER DODUC: I think that actually is quite a number, but --

MR. PORGANS: I want to go back and examine the Exhibit 511, and I want to -- that's the DWR-511. And then I want to go back and look at different scenarios on that 16-year run for them coming up with the California WaterFix on that.

CO-HEARING OFFICER DODUC: All right.

MR. PORGANS: Okay?

CO-HEARING OFFICER DODUC: So let's now focus on the 16-year interval that was used for the DSM2 run.

MR. PORGANS: Can you come down a couple more pages on that, please?

CO-HEARING OFFICER DODUC: While I recognize that you have not been in attendance and have not been feeling well, I would just have to say that we did spend quite a bit of time on why the 16-year interval was selected and how it is representative of the 82-year period.

So to the extent that we can, please try not to cover that again.

MR. PORGANS: I will, and I would like you to

know that I was watching the program.

CO-HEARING OFFICER DODUC: Thank you.

MR. PORGANS: So I -- you know, and I realize, you know -- thank you.

Can you go down? That's more on the model, not -- models. Worthless, according to that guy.

Anyway, move down to the next exhibit, please. That would be Exhibit No. 104. Could you stop there for a second.

What I did here -- and I don't know where this graph is.

MS. RIDDLE: This is a multi-colored bar chart, Porgans 104.

MR. PORGANS: Should be just before this. Keep going down, then.

MS. RIDDLE: Keep going down.

MR. PORGANS: Well, there's another graph we could use.

MS. RIDDLE: Can you keep going? He's looking for a graph.

MR. PORGANS: We're going to have to go back the other way. I apologize. It's ridiculous.

I'm looking for the Sacramento River unimpaired runoff from 1906 to the present.

CO-HEARING OFFICER DODUC: If the witnesses

actually have that? Do you see it? All right.

Mr. Porgans, never mind the screen. Go ahead and ask the witnesses your question.

MR. PORGANS: All right. So what you did is you looked at -- you took that period there from -- I believe it was 19- -- was it '76 through '91?

WITNESS NADER-TEHRANI: That is correct.

MR. PORGANS: That's correct?

WITNESS NADER-TEHRANI: Yes, that is correct.

MR. PORGANS: Okay. And then did you take -- I understand that you were concerned about data going back a ways, that it may not be accurate. You know, some of the data going back to the '30s or the '40s. So you wanted to use some new information that could be more reliable; is that correct?

WITNESS NADER-TEHRANI: That was part of reason for making that selection.

MR. PORGANS: Was there some other reason?

WITNESS SMITH: I think the other reasons were in the memo to Cathy Crothers. I can't remember the exhibit number.

MR. PORGANS: I have it right here. I'm going to pull that one up in a minute. That's 511.

WITNESS SMITH: Yeah. Okay.

MR. PORGANS: But anyway, why didn't we take

and look at, say, 2000 to 2014 or 2015, the same 16-year period?

WITNESS NADER-TEHRANI: I think I explained before that CalSim only goes up to 2003. The hydrology that was developed for future level of development that was used in this hearing was only available to 2003.

MR. PORGANS: But didn't we update CalSim II?

WITNESS NADER-TEHRANI: But that's -- again, we have, but the hydrology is only available to 2003.

MR. PORGANS: So when would we get hydrology going forward from 2003? This is 2016.

WITNESS REYES: I think Mr. Munevar might have stated earlier. Although we have the hydrologic data needed to update the hydrology portion of CalSim II, we don't have the land use data to update that. So there's -- in the past I think there's been about a ten-year lag in updating the hydrologic years that we add to CalSim. Like, the last time we updated was up to 2003, was 2003, but before that we were using up to 1994, I believe, in our typical modeling. And that was done also in the '90s.

So there's just this typical lag to get the information that you need to put together those extended years.

MR. PORGANS: I understand what you just said.

Thank you for the answer to that question.

It brings me back -- I've got to go back to 1-- Porgans Exhibit 100 there, the one that was just up there last. And what I want to do here, just so we understand -- and if I'm out of order, please tell me, because I'm not trying to make a case here. I'm just trying to ask a question.

And can you get that up there when you get a minute, please? Keep going. Keep going. We're back at the top. We need to go back. Keep going. Keep going. Keep going. We got about four or five more pages here to go.

MS. RIDDLE: The table numbers.

MR. PORGANS: Yeah. I'm sorry. Right there.

Okay. So what I did is taking that 1906 to the 2015 period, I broke them down in 16-year increments. And if you look at that chart, it tells you that the '76-'91, you had five critical years there; three dry, two below normal, two above normal, and four wet.

And you get -- if you look at just that index for the Sacramento River for the unimpaired flow, it shows you that the most amount of water you're going to get out of that system is 264 million. That's over that period of 16 years for that particular scenario,

that 16-year scenario.

If you go back and you look at a difference scenario, even though you don't have the hydrology for it, and you look at what's going on from, say, 2000 to 2015, or if you look at, say, '28 to, say -- what was it? -- '24 to 1938, this scenario that they're presenting here is going to maximize -- well, how does that scenario -- how would that scenario there compare to the other two scenarios in terms of increasing your water reliability?

WITNESS NADER-TEHRANI: Well, I believe that the water supply analysis that looks at a lot of these are actually done for the entire 82 years. The only thing that we did differently was for water quality and water levels, and I went over the reasons.

And if you want I can -- yeah.

CO-HEARING OFFICER DODUC: No.

WITNESS NADER-TEHRANI: Yeah, the reasons why we chose those 16 years as a representation of the 82 years.

CO-HEARING OFFICER DODUC: So, Mr. Porgans, I'm not sure I understand this -- the 16-year analysis was specific for the DSM2 modeling --

WITNESS NADER-TEHRANI: That's correct.

CO-HEARING OFFICER DODUC: -- which focused on

water quality. You were just asked a question about water reliability for which the analysis was conducted.

WITNESS NADER-TEHRANI: Based on 82 years.

CO-HEARING OFFICER DODUC: Based on 82 years.

So your question is?

MR. PORGANS: When you're dealing with the water amount, quantity, and you also factor in quality, when you're dealing with this California WaterFix; is that correct?

WITNESS NADER-TEHRANI: Once you go beyond a certain -- you know, beyond a certain wetness, so to speak, then the water quality is good no matter -- you know, if you add another million acre-feet, you're not going to see a different water quality.

MR. PORGANS: If I may. The difference I'm asking you about has to do with the amount of water that you would to have provide in order to meet a quality or standard, absent the fix. If you had to push that water down into the Clifton Court Forebay, that's going to cost you some water and water quality, is it not?

CO-HEARING OFFICER DODUC: But that kind of analysis, as I understand it, was done in CalSim not in DSM2. And for CalSim analysis, they used the entire 82-year hydrology.

MR. PORGANS: I got that part. I think my question was -- moving on to the DSM2, was what the benefits would be as a result of taking the water from that point? Are they going to save themselves some water? That's my point, in terms of having to meet a standard for water quality or carriage water.

CO-HEARING OFFICER DODUC: Do you know the answer to that question?

WITNESS NADER-TEHRANI: I do not know the answer to that question.

CO-HEARING OFFICER DODUC: He does not know the answer.

MR. PORGANS: Okay. All right. I'm almost done here, and I want to thank you for letting me go ahead of you. And your patience is almost like a saint with me. I understand. Thank you.

So lastly, then, what I'm seeing here based on the information that I -- excuse me. I want to go to this DWR-511. And this is the Crothers memo.

CO-HEARING OFFICER DODUC: DWR-511. DWR.

MR. PORGANS: So right there, right up at the top, it's telling us that this is going to summary for consultant review. This particular model is going for the review for the consultants.

Could you identify who those consultants are?

CO-HEARING OFFICER DODUC: And since this memo is from Mr. Reyes, Ms. Smith, and Dr. Tehrani, I guess one of you will have to answer.

WITNESS NADER-TEHRANI: I'm trying to remember. This was three years ago. But I believe it was partly for the consultants who were working on the -- you know, writing the EIR. That would --

CO-HEARING OFFICER DODUC: And they were -- do you remember?

WITNESS NADER-TEHRANI: Perhaps you can --

WITNESS BUCHHOLZ: CH2M Hill.

CO-HEARING OFFICER DODUC: Would that be you, Ms. Buchholz?

WITNESS BUCHHOLZ: No. That would be people that worked for me in that time.

CO-HEARING OFFICER DODUC: Okay.

MR. PORGANS: So you don't have an answer to that?

CO-HEARING OFFICER DODUC: Mr. Porgans, the answer was -- it was directed to CH2M Hill and specifically to people who worked for Ms. Buchholz. So she might be able to answer questions that you have.

MR. PORGANS: So what would be the idea for the CH2M Hill or somebody else to be reviewing this? I understand they are consulting but --

WITNESS BUCHHOLZ: I'd like to have the representatives from Department of Water Resources who basically provided us this memo specifically required. We used it in a fashion to answer the question of continuing to -- or to do the analysis for the Bay-Delta conservation plan as part of -- we wanted to document the reasons in the Draft EIR/EIS of why we used the 16 years versus an 82-year period.

So this is the purpose of the memo, was to be included in the Draft EIR/EIS.

CO-HEARING OFFICER DODUC: Okay.

MR. PORGANS: So my question, then, with respect to having this go over for the consultant review, what input have they had in actually developing this particular DSM2? How involved were they?

WITNESS NADER-TEHRANI: I'm not sure I understand. Are you still questioning the 16-year versus 82?

MR. PORGANS: Yeah. I'm talking about the DSM2, yeah. 16-year, who came up with that?

WITNESS NADER-TEHRANI: The 16-year was selected about 16, 17 years ago by DWR.

CO-HEARING OFFICER DODUC: And we have covered that, so.

MR. PORGANS: Okay.

CO-HEARING OFFICER DODUC: Let me see if I can -- Doctor, the decision go with the 16 years, was that decision made by the Department, or was it made by CH2M Hill?

WITNESS NADER-TEHRANI: By Department 16, 17 years ago.

CO-HEARING OFFICER DODUC: Made by the Department 16, 17 years ago.

MR. PORGANS: Okay. Just for the record, I heard what he said. You're saying this has been around for how many years, 17 years?

WITNESS NADER-TEHRANI: That's correct. The same 16-year -- this is the standard -- has been the standard practice where we do the DSM2 for the same exact 16 years for all the studies that we've done; not just California WaterFix, for all the other projects that we've been working on or almost all of them, the same 16 years.

CO-HEARING OFFICER DODUC: During those same 16 years, have you occasionally revisit and confirm that it's still appropriate?

WITNESS NADER-TEHRANI: Yes, we have.

CO-HEARING OFFICER DODUC: Thank you.

MR. PORGANS: Okay. Well, I thank you for that. I'm going to just leave that one go. I'm want

to go to DWR-4 again on Page 18.

Is that what that says there? I'm sorry.

MS. RIDDLE: Yes, DWR-4, Page 18.

MR. PORGANS: And this will be my last question.

CO-HEARING OFFICER DODUC: Sorry. 4 or 5? Because 5 was the modeling presentation. 4 was the operation.

MS. RIDDLE: 4. 4.

CO-HEARING OFFICER DODUC: 4? Okay.

MR. PORGANS: But it says here --

MS. RIDDLE: I think it's the operations presentation. It's the compliance pie charts.

MR. PORGANS: And that was page number?

MS. RIDDLE: Page 18.

MR. PORGANS: Page 18. Thank you so much.

So, you know, when you're looking at '78 to 2015 and you're telling us -- if I'm out of order here asking these people, you let me know because, you know, I would have asked the other guys.

So in this, it says to us that we got 98.9 percent meeting the objectives. And that's very -- you know, I commend you for that.

However, did you go back and look at individual periods like for pre and post droughts to

give us a better idea of the level of exceedances that are taking place out there? Because it doesn't seem to correspond with your information.

So my question is have you gone back and looked at, say, '87 to '92, and look at your exceedances there as opposed to looking at it over the entire length of the project? Because conditions in the Delta could make it so you don't have to release water. So have you looked at that?

WITNESS SMITH: So I need to get some clarification I think. The graphic that we're looking at, I believe John Leahigh was looking at actual observed data not modeling data. So this is what he -- and I'm paraphrasing -- what he presented in reality, how well the project operated during that time period, and not modeling-wise.

So could you clarify if you need additional information?

MR. PORGANS: Yes. Thank you.

Do we have that here where we looked at just, you know, like, '87-'92? Or am I misunderstanding you?

WITNESS SMITH: So I think that '87 to '92 would have been included in his analysis from the 1978 to 2015.

MR. PORGANS: Okay. All right. So what I

want to do now is I want to look at one particular year, you know, to look at the number of exceedances that took place to give you some idea as to what we're concerned about here. Okay? If that's okay.

So if we go back to Porgan's exhibit -- hold on here. It's Porgan's Exhibit 105. And it's about -- at least five more pages down.

Oh, and by the way, I was -- my computer was hacked, so this is one of this things that happened when you're hacked.

And this is my last question. It's coming right after that. There it is. Stop right there.

So what we're looking at here is this is a document that's in the files already. It's from the 1992 hearings the State Board held on exceedances for D1485.

Now, if we go down one more page. And this is their exhibit. This is State Board's Exhibit 19 and 20. If you look up there at that, it's going to show us that in 1991, we had 218 violations and 111 days of violations total; 111 days we violated.

That doesn't tell me this year. You know, if I look at those years where we were impacted, these conditions become really serious. And what I'm saying, if you have your model and you're making your

assumptions and you're trying to figure out what's going on, these things happen. These are droughts, and they come, you know, almost routinely. So there's 111 days of violations.

CO-HEARING OFFICER DODUC: And your question, Mr. Porgans?

MR. PORGANS: The question is, is where was the model then?

CO-HEARING OFFICER DODUC: I'm sorry. Where's the what?

MR. PORGANS: Where was they then when they were trying to figure out how to meet Delta conditions? Where did the model fit in, DSM2, CalSim II, operational requirements? How did that fit into this? How did that happen?

CO-HEARING OFFICER DODUC: I don't know if you're able to answer.

MR. MIZELL: Just for the record, I'll object to the relevance of how the 1991 drought happened, to the proceeding here for the California WaterFix.

CO-HEARING OFFICER DODUC: So noted.

Are any of the witnesses able to answer? If not, we will --

WITNESS SMITH: I am not sure if -- DSM2 was not in existence at that time. Previously we had

another model that we used, but I do not know if it actually was used in the process of operations. I don't think we -- at least our group didn't start doing that until later in the '90s.

MR. PORGANS: Thank you. Thank everyone here for what you're doing. I hope we get it straight. And thank you, Ms. Co-chair.

CO-HEARING OFFICER DODUC: Thank you, Mr. Porgans.

MR. PORGANS: Thank you also.

CO-HEARING OFFICER DODUC: With that, we will take our lunch break.

Would everyone mind taking a bit of a shorter lunch break and returning, say, in half an hour? Or do you need more time? 1:30? All right. We will resume at 1:30.

(Whereupon, the luncheon recess was taken at 12:46 p.m.)

AFTERNOON SESSION

(Whereupon, all parties having been duly noted for the record, the proceedings resumed at 1:30 p.m.)

CO-HEARING OFFICER DODUC: All right. I represent it is 1:30. We are reconvening.

And I see Ms. Suard is here.

And as Ms. Suard is gathering her things, let me ask Mr. Mizell. In her cross-examination of the previous panel, she had prepared a presentation. And I'd asked that Petitioners work with her and come prepared today to address her questions as part of this cross-examination.

I trust you have done that and you're prepared to answer her questions?

MR. MIZELL: Yes. We -- Ms. Suard and I exchanged some e-mails on the information that she was looking for. Our staff spent a considerable amount of effort trying to get something to her this week that addresses it. And we have witnesses on this panel who are prepared to answer questions.

CO-HEARING OFFICER DODUC: Perfect.

Ms. Suard?

WITNESS NADER-TEHRANI: I have to say I don't have a copy of that in front of me, if you want to ask

specific questions about that.

MS. SUARD: Yes, it will be up there.

WITNESS NADER-TEHRANI: Okay.

MS. SUARD: I gave it to the --

WITNESS NADER-TEHRANI: Sounds good.

CROSS-EXAMINATION BY MS. SUARD

MS. SUARD: For the record, my name is Nikki Suard. I'm with Snugg Harbor Resorts LLC. And thank you for having me here. I'm quite interested in modeling, and I -- actually, I had prepared quite a few slides.

Can you hear me okay? Okay.

I prepared quite a few slides. And then because of a lot of the questioning over the last couple of days, I've actually reduced it about half. And so if you see, my slides go a little bit out of order. You will see I already requested that I skip a bunch, basically.

So I wanted to start out with, was any of the modelers there in -- you can see that slide, and it came from the Water Rights Control Board presentation in 2008.

Are any of the -- our modelers here? Nobody was there. Okay. Okay.

I'm just going to read it. And I'm doing this

for the purpose of just trying to explain that -- all of us, we just want to understand. And I'd already explained to some of the modelers that I got an opportunity to talk to that I think that there's this really fundamental difference in focus. Whereas modelers do averages over long amount of time, we on the water, anybody who uses the water for drinking or for irrigation, we're concerned about the extremes. And so when we ask questions, it's really about the extremes. How is this project going to affect us in the extreme times? So a lot of the questions have been about looking at inconsistencies.

So I found the statement, "Inappropriate inconsistency can result in inequitable treatment, no common understanding of key water quality and water rights goals, and difficulty in achieving a meaningful evaluation of the outcomes."

Would the modelers agree to this? Is there anybody that would step up and say they agree?

WITNESS NADER-TEHRANI: Perhaps it's English being my second language. I'm trying to comprehend exactly. I'm not quite sure I quite get it.

MS. SUARD: Okay. I'm just going to move on, then.

Okay. So the next slide, please.

Oh, just for a summary, even though you didn't ask me, I'm going to have --

CO-HEARING OFFICER DODUC: Oh, thank you.

MS. SUARD: I'm going to have just some -- a little bit of general questions or observations, and then I'm going to --

CO-HEARING OFFICER DODUC: Make that questions rather than observations.

MS. SUARD: Okay, questions.

And then I'm going to have DSM2 questions which will lead into what was provided by DWR. And then I do have some day flow CalSim questions that are much more basic than everything else you've heard. I'm just much more basic. So, hopefully, I don't think I will use a whole hour, but it kind of depends on how fast we go.

I think with DSM2 it might be Tara Smith or, you know, one of those modelers.

Okay. So I'm -- so my second slide is -- it's from -- I believe it's 2007, actually, a Mr. Aaron Blake with USGS who was doing a seminar. And it talks about the need for bathymetry. That's how I say the word. I've heard it a couple different ways. And it refers to DSM2 in that slide.

Do you see that, Ms. Smith?

WITNESS SMITH: I'm looking at the slide right now. So, yes, it -- I guess any of the Delta models would need appropriate bathymetry I think in terms of evaluating whether or not they're -- when you look at it, you need to evaluate your input to get an understanding of what level of accuracy you're going to have in your output. So I think that's --

MS. SUARD: Was it you yesterday who said that you have concerns in that area? Was that what you were referring to?

WITNESS SMITH: I'm not sure if I currently have concerns about the bathymetry. I don't think that's what I said. But we did -- I think what I was referring to is -- I think I was referring to, because we're always looking at the data and always trying to get it updated -- is that within the drought period we had some concerns with the input data. And that was reflected in how we compared it to the observed data. So we did a fair amount of research for the drought period to see how well we could improve or interpret that when looking at the modeling results.

MS. SUARD: And that research included recalibration of DSM2?

WITNESS SMITH: No, not for that particular time. We do have a calibration of -- we have updated

the calibration, and the calibration can be found -- calibration and validation can be found on our website and --

MS. SUARD: That's okay. I'll be going to that.

WITNESS SMITH: Right. Okay.

MS. SUARD: I just -- this is going to be DSM2 questions.

WITNESS SMITH: Okay.

MS. SUARD: Can we go to the next slide, please? This slide is only offered as a representative of, you know, basically how groundwater is recharged. It came from Bay-Delta planning process.

And I apologize. I should have switched to one of the WaterFix because they -- WaterFix has a very similar slide.

And my question is do computer models used for WaterFix -- so I guess that's either of the two everybody's been discussing -- for the WaterFix proposal analyze or reflect impact to groundwater recharge of the drinking water aquifer in the Delta and then also around the Delta? Yes or no? Does it reflect impact to drinking water in the Delta?

MR. MIZELL: I'm going to object. We've been through the groundwater modeling and the groundwater

recharge line of questioning several times in the course of this panel's testimony, and I'll just leave it at that.

CO-HEARING OFFICER DODUC: Ms. Buchholz in particular I think has addressed this question several times. May I ask where you're going with this, Ms. Suard?

MS. SUARD: I was just asking for a yes or no answer.

CO-HEARING OFFICER DODUC: Is it leading to something else?

MS. SUARD: Yes.

CO-HEARING OFFICER DODUC: Let's go there.

MS. SUARD: Okay. Is there a better tool? And I know that this has been asked too. Is there currently a better tool to determine impacts to groundwater?

CO-HEARING OFFICER DODUC: Ms. Buchholz?

WITNESS BUCHHOLZ: With the level of data that we have, the regional-type data that we have as we were preparing the EIR/EIS and preparing for this hearing, no. We will be using more detailed groundwater analytical tools during the design phase when we have better geotechnical information and information from wells that are adjacent to the areas that we could

affect.

MS. SUARD: Okay. Next slide, please. This is -- again, I've brought this up before. This is from GeoTracker, waterboards.ca.gov. This is maps around the North Delta.

And is this what you're referring to of modeling that will be done sometime down the road to assess impact to all these different -- these are more public drinking water wells in the area that could be impacted by WaterFix. Are all of these going to be assessed, impacts to all of these wells?

WITNESS BUCHHOLZ: Not all of the wells shown on this map. Wells that -- and we are aware of this, and we looked at this during the preparation of the documents as well as several other ones that were done by Yolo County and DWR.

But it will be associated -- specifically during construction, it will be areas that are close to the construction locations. And then the DSM -- or CBHM model analyzed the interactions between the change in surface water flows in the Sacramento rivers and other rivers with the groundwater based on the regional model for -- as part of the EIR/EIS.

MS. SUARD: So I think I had heard that the modeling is based on a projection to 2030; is that

correct? That was just said in the last 24 hours.

WITNESS BUCHHOLZ: That's the CalSim model for no action and all the alternatives.

MS. SUARD: Okay. Did the CalSim model assume the same number of wells and humans in the Delta, or did they project for growth?

WITNESS MUNEVAR: The land use projections were projected out through 2030. I don't know specifically to the Delta whether there were adjustments or not. But Central Valley-wide, the land use projections were out for 2030.

MS. SUARD: So specifically to Steamboat Slough, Sutter Slough, Walnut Grove area, did any of the computer modeling model for the wells in that area? I think you said no. The current modeling.

WITNESS BUCHHOLZ: There is for part of our regional analysis, but not -- we did not do any individuals anywhere in the Delta or anyplace else.

MS. SUARD: But it's individuals that will be -- could be impacted, right?

WITNESS BUCHHOLZ: Yes, but the analysis that we've done at this point is a regional groundwater model.

MS. SUARD: Okay. Next slide, please. So this is a slightly different map. This actually is the

water rights associated with the legal Delta. it's another one of the maps you can find online. And the link to where is on there. It is at statewaterrightscontrolboard.ca.gov/waterissues, and it goes on from there. And there's been a lot of talk about the surface water rights.

Is it the testimony that surface water quality will not be impacted by WaterFix once it's in operation?

WITNESS NADER-TEHRANI: Can you be specific to the area? Are you talking about the area you --

MS. SUARD: Let's -- specific for water users on Steamboat Slough and Sacramento River down to Rio Vista.

WITNESS NADER-TEHRANI: Those areas, no. I do not see any water quality effects in the areas you just mentioned.

MS. SUARD: Are there areas where you believe there could be water quality impacts? Water quality salinity; I'm talking about salinity at this point in time.

WITNESS NADER-TEHRANI: That's right. I think my testimony, I did identify Emmaton as an area.

MS. SUARD: Okay. Did you -- I think some people brought this up. Did you look at other water

quality issues?

WITNESS NADER-TEHRANI: When you say -- can you be specific?

MS. SUARD: Sure. Impacts from boron.

WITNESS NADER-TEHRANI: I personally did not. But, Mike?

WITNESS BRYAN: Yes, in the Draft EIR/EIS and then also the Recirculated Draft, we actually looked at 182 different constituents.

MS. SUARD: Did you look at arsenic?

WITNESS BRYAN: Yes.

MS. SUARD: Manganese?

WITNESS BRYAN: Yes.

MS. SUARD: Okay. Where is that?

WITNESS BRYAN: It's the water quality chapters, Chapter 8 of the EIR/EIS.

MS. SUARD: And were there -- how did you come up with an assessment that water quality regarding these particular elements that I just mentioned would -- it will -- does it impact at all? Is there any change based on current?

WITNESS BRYAN: We started with what we call the "screening analysis." So we compiled historical data for all these 182 water quality constituents. And the first thing that we looked at is whether they ever

exceeded detection limits, were they ever detected in the monitoring locations that we compiled the data from.

If they were never detected or they were detected but were always far below applicable criteria or objectives -- they were not 303D listed; they had very similar concentrations among the major source waters to the Delta -- they were not raised as constituents of concern through the scoping process.

And they were not a major concern to us as practitioners -- all of those were removed from further consideration in the screening analysis because our conclusion was no matter how the hydrodynamics of the Delta change, based on the considerations that I just went through, California WaterFix really could not affect the concentrations of those constituents to levels that would adversely affect beneficial uses.

So that took the first 125 constituents off the table.

There were about 15 other constituents that we looked at a little bit further in the screening analysis, things like dioxins and furans, PAHs, PCBs. And those received a little bit further analysis.

We also concluded that the California WaterFix would not affect the concentrations of those in the

waterways of the Delta, or anywhere else in the affected environment at levels that would adversely affect beneficial uses.

That left about 56 constituents that we analyzed in detail in the EIR/EIS in 15 different categories, either individual constituents or constituent groups such as pesticides.

And what we did -- some of those constituents of course are EC chloride, things we've been talking about. And we have models like DSM2 that directly assess those.

For all the other constituents, what we did is we used the DSM2 fingerprinting that we get from DSM2, which is for any given location in the Delta -- and of course we focused on our 11 -- we had a standard 11 different assessment locations.

We looked at the source waters to that location on a monthly average time step. So for the 16-year period of record for DSM2, we could tell what portion of the water at each of these locations came from the Bay or the San Joaquin or the Sac or the eastside tributaries or ag return water.

Then we had historic -- concentrations from a historic period of record for each of those constituents, those 56 different constituents -- or

actually not all 56 of those; the ones that we analyzed quantitatively, which is a shorter list.

And we could take those long-term average concentrations, multiply them by the source fraction, and in a mass-balance approach, we could figure out what constituent concentration was at the location, based on, again, the concentration of each of the source waters and the amount of source water that came to that site.

And we would do that for the no action alternative as well as each of the California WaterFix alternatives and then of course compare the differences.

MS. SUARD: Okay. So thank you.

That lengthy explanation, did that apply to groundwater analysis as well, or is that just surface water?

WITNESS BRYAN: The analysis that I just referred to was just surface water.

MS. SUARD: Surface water.

Does that include mercury? I forgot to mention that.

WITNESS BRYAN: Yes.

MS. SUARD: Yes. Okay.

WITNESS BRYAN: There was also additional

modeling for mercury beyond what I just described.

MS. SUARD: Does that cover up in the Yolo Bypass area?

WITNESS BRYAN: It included concentrations of mercury from water coming from the Yolo Bypass, yes.

MS. SUARD: What about the Woodland Catchment Basin area?

WITNESS BRYAN: Again, the way that we did the analysis, we got concentrations from the major source waters, the five major source waters of the Delta. So even for most constituents, the Sacramento River at Freeport represented, like, Yolo Bypass. But for certain constituents, if the Yolo Bypass had a substantial standout difference in concentration, such as for selenium, then it had its own source fraction.

MS. SUARD: And mercury. Yeah. Okay.

Next slide, please. We can skip that one. Don't need to go that -- Slide 7.

So this map actually comes from ICF Bay-Delta Conservation Plan draft from 2013. I'm just using it for reference.

CO-HEARING OFFICER DODUC: And for the record, it is Page 7 of?

MS. SUARD: Of Snugg Harbor Resorts SHR-104. These are just submitted for the conversations, not

anything else, really, at this point.

And I put that map up there because I don't know that a lot of people realize that there have been ongoing restoration projects in the Delta, and I think this relates to DSM2.

And, Ms. Smith, could you explain how DSM2 might have been recalibrated including that area called Liberty Island, please?

WITNESS SMITH: So prior to the work on the Bay-Delta conservation plan after Liberty Island was flooded, that bathymetry was included in the calibration that was done in 2009.

MS. SUARD: Okay. In 2009.

Do you see the No. 3 on the map? It says "Steamboat Slough downstream of Sutter confluence."

WITNESS SMITH: Yes, I do.

MS. SUARD: I just want to make note that's another one of the bench restoration sites. I just want to make sure that people are aware of some of these locations. If they haven't been on the water, it's kind of a little bit harder.

Slide -- can we go to Slide 26? I'm skipping a bunch that we don't need to do right now.

Okay. So this is a -- Ms. Smith, this is a grid for DSM2; is that correct?

WITNESS SMITH: Yes. It's a visual of where the -- you know, the little circles are the nodes of the network, and the lines between them are -- represent the channels.

MS. SUARD: Just for the record, that is DWR-5 from the WaterFix hearing. And I did edit it, so I put SHR-39 WF on it because I circled the Liberty Island area.

And I just -- could you explain what DSM2 -- how -- does it model the impact from those flows from Liberty Island, how it impacts Steamboat Slough and lower Sacramento River?

WITNESS SMITH: You know, it's been a long time since I've looked at that data, so I don't think I'd be able t do that right now. Sorry.

MS. SUARD: Okay. But it's meant to simulate Delta hydrodynamics and water quality. That's what DSM2 -- that was the little screen print imprinted in there.

WITNESS SMITH: Yes, that's what DSM2 does.

MS. SUARD: Okay. So the next slide is -- this also comes from WaterFix. The one on the left is a grid of DSM2; is that correct? Just a portion of it, right? Does that look familiar to you?

WITNESS NADER-TEHRANI: Yeah, that's correct.

MS. SUARD: Yeah. I'm sorry. I'm focused on North Delta. The rest of the Delta counts too, but I'm really focused on this area because I'm pretty familiar with it.

So those little notations on that grid, what do those stand for?

WITNESS NADER-TEHRANI: Which notations? Can you be specific.

MS. SUARD: I'm sorry. You've got these little circles with numbers.

WITNESS NADER-TEHRANI: Yes.

MS. SUARD: And I believe those represent the cross-sections; is that correct?

WITNESS NADER-TEHRANI: No. The little circles we refer to as nodes or junctions, and the line that connect the circles are what we call "channels," so.

MS. SUARD: Okay, the channels. Okay.

So the graphic on the right, that actually came from the Bay-Delta conservation plan hearing process. But I thought it was a good graphic.

Does that show the geometry used for DSM2?

WITNESS SMITH: So let me -- I'm not quite sure exactly what you're saying. I think the -- the graphic is on the left corner of that right part where

it has that trapezoidal channel there, is basically just to explain how the one-dimensional aspect works in a channel where it moves up and down.

The actual model has cross-sections in them that probably look more like the right bottom corner of the picture. So in a sense, yes, it -- for channels that's how -- the right bottom is more representative of how it looks like.

MS. SUARD: So that's the green-and-brown one?

WITNESS SMITH: The green-and-brown one, yeah.

MS. SUARD: That was something that had come up in Bay-Delta Conservation Plan one, and that's why I thought, okay, which one are we dealing with?

And how do you come up with the channel depths and all that stuff?

WITNESS SMITH: You want to go, Jamie? Okay.

I thought she -- Jamie had gone -- or Dr. Anderson had put that in.

So there's a number of sources for the bathymetry of the channels. There are various groups that take measurements including DWR. So we receive the information from that. And in the past, we've used this program called CSDP to generate the channel cross-sections. We look at the cross-sections and then we put them into DSM2.

MS. SUARD: Can we get the next slide, please? It might go up. Okay.

So this -- actually, that slide comes from the Revised Draft BA Alternative 1. But again, I'm just using it as a graphic example of what I'm asking about.

So according to the documents, there are certain channels that were re- -- they did site scan sonar, whatever they do, to determine the revised depth of the channels; is that right? Those are the ones that were redone?

MR. BERLINER: I'm going to object to this line of questioning. We're again going on very basic elements of a model as opposed to how this model relates to this proceeding. I think if she wants to tie it into concerns that she has, that's fine. But this is very generic testimony.

CO-HEARING OFFICER DODUC: So, Ms. Suard, where are you going with this?

MS. SUARD: Can we go to Slide 30, please? There we go.

So where I'm going with this is I just actually received this last week, and it represents another update. At least it was dated 2016. And I -- there are cross-sections. These -- these channels and their depths are based on cross-sections; is that

correct?

MR. BERLINER: I've got the same.

CO-HEARING OFFICER DODUC: Yes. So what is this?

MS. SUARD: Okay. So what I'm asking is who determines where those cross-sections go, and the reason I ask that is because if the cross-section is really a misrepresentative of what's really there, that impacts the flow analysis.

CO-HEARING OFFICER DODUC: And are you specifically concerned about the impact to your area?

MS. SUARD: Yes.

CO-HEARING OFFICER DODUC: Is there -- was Steamboat Slough one of the cross-sections analyzed? How did you analyze it? And are you able to answer Ms. Suard's concern with respect to potential miscalculation involving that slough?

WITNESS SMITH: So the cross-sections we put in there so -- for the California WaterFix, the cross-sections are representative -- as far as I understand it, of the bathymetry that has been collected since prior to 2009. And how it is determined is based on the data, how much data is, where it is. And the person who's putting -- who is looking at those cross-sections are the ones who make a

judgment on how that -- those cross-sections are put in there.

In terms of how it affects the flow, with anything in terms of the stuff, I would direct folks to go look at the calibration and look at how possibly the flow deviates from observed measurements in terms of how well the model does the flow.

And that can be taken into consideration, and we have taken it in consideration when evaluating how well the model does as part of this California WaterFix plan.

So I don't know if that was helpful or not.

MS. SUARD: Yes.

For Steamboat Slough, is there a specific name of a person or organization that made determinations of what cross-sections to use?

MR. MIZELL: I'm going to object to the relevance of who actually performed the modeling. Certainly the accuracy of the modeling is at issue here, but the specific staff person who performs it is really irrelevant.

CO-HEARING OFFICER DODUC: I think where she's going is, is that person available to answer her questions.

WITNESS SMITH: There are several people who

have worked on these cross-sections over the years, and as they're updated, different people come in and do the work on it. So there is not one single person who has worked on these cross-sections.

CO-HEARING OFFICER DODUC: But are you able to answer if Ms. Suard has specific questions about Steamboat Slough and potential DSM2 modeling associated near her property?

WITNESS SMITH: I guess it depends on the questions.

CO-HEARING OFFICER DODUC: All right. Well.

MS. SUARD: Okay. So I'm going to -- I'm asking these questions because if there are structures that block or divert flow, it impacts water quality down by me. So I did go to modeling as much as I could find online.

Can you -- next slide. No. We can go past that. We already talked about that. Okay.

So I -- actually, I've had many conversations with a Mr. Paul Marshall and Mr. Holderman about this particular issue. And I'm going to go ahead and go past this because you can't -- I don't know if you can still get that online.

So let's go to the next slide, please.

CO-HEARING OFFICER DODUC: So we're on Slide

33, for the record.

MS. SUARD: Yes. We're on Slide 33. Sorry.

And on the upper left is a slide provided to me by Mr. Paul Marshall on 6/17/2014, because I had been asking about a subsurface flow barrier across Steamboat Slough that you can see on depth finders.

So actually, I was provided with quite few slides, and a 3D model was made from that. So the picture on the right is a 3D modeling of the subsurface flow barrier on -- that's at the head of Steamboat Slough about 20 feet east of the bridge.

And from what I could tell from the data I could gather, this did not show in any of the DSM2 modeling, the cross-sections. And --

CO-HEARING OFFICER DODUC: And -- hold on. What is your specific question for this panel?

MS. SUARD: Okay. Why -- did this panel -- was this panel aware that there were flow barriers at the north end of Steamboat Slough?

MR. MIZELL: I'm going to object.

MS. SUARD: That there are flow barriers? It's not where.

MR. MIZELL: I'm going to object. She -- the questioner is introducing evidence that's not in the record. There's no evidence about a barrier. This

could be sedimentation. This could be any number of things. This is a bathymetry, and it has nothing to do with any structure, as far as I can tell, on this screen.

CO-HEARING OFFICER DODUC: Ms. Smith, are you aware of any barriers?

WITNESS SMITH: I would not call those "barriers." So in the sense of -- I don't agree with the premise of your question.

I am aware of the data that Paul Marshall provided because that was provided via my group. And there were three or four graphs we had provided of that area over time, and looking at how that may have shifted or not shifted over time.

MS. SUARD: Okay. Whatever this area is called, was -- was the -- and I think Mr. Holderman called it a sand berm or something like that.

Was that included in the DSM2 modeling, something that was restricting flow into Steamboat Slough?

WITNESS SMITH: I think in the sense of that, you know, if you're looking at that specific cross-section, I could not tell you if that was specifically because I haven't looked at that recently, if that particular cross-section. I think in the sense

it's been included in that other parts of it and how we calibrate the model using Manning's n to adjust for flows going into different portions, it's accounted for.

WITNESS NADER-TEHRANI: Can I add one thing? Because I have dealt with the calibration validation before. And in the earlier phases when we were just beginning to develop DSM2, we were noticing at times that there were certain locations that the flows just don't match the observed data. And those kind of clues that there is something in the physics that we are not capturing, and when we dig in deeper, we notice there are issues with the bathymetry.

So whenever we see a deviation between observed data, and I'm referring to the flow calculated versus those that are observed, that to me is an indication there is something wrong with the bathymetry.

CO-HEARING OFFICER DODUC: Have you ever noticed any sort of deviation near Steamboat Slough?

WITNESS NADER-TEHRANI: I have not seen any. And I am somewhat familiar with that sand berm.

CO-HEARING OFFICER DODUC: All right. Thank you.

MS. SUARD: It keeps being referred to as sand

bar. Are sand bars created by revetment rock?

CO-HEARING OFFICER DODUC: I think, Ms. Suard --

MS. SUARD: Okay. I'll go on.

CO-HEARING OFFICER DODUC: Go on, because I think you've gotten all can you with this. And whatever it's called, it's certainly -- according to Ms. Smith, she does not recall it being part of the D Sim model. So move on, please.

MS. SUARD: Next slide, please. It's -- no. There you go.

Were any of you at the -- this Bay-Delta office -- it was a DSM2 user group for modeling? I believe maybe a couple of you might have been there. It's 2009 modeling group?

MR. BERLINER: Again I'm going to object to relevancy here and see if we can kind of get to the punch line that Ms. Suard's trying to go toward.

MS. SUARD: I wanted to understand what this -- the flow model at that time in 2009 was trying to show. It appears from the graphics from -- I wasn't at that meeting.

CO-HEARING OFFICER DODUC: I'm sorry, Ms. Suard. How is this -- was that part of what was submitted for the WaterFix petition?

MS. SUARD: No, it wasn't. So I'll move on, then.

CO-HEARING OFFICER DODUC: Please.

MS. SUARD: Okay. So the next slide -- that's out of order. Please go again. Okay. So we need to go to Slide No. 40.

I -- I did go to the documents for this hearing and the Revised Draft BA -- let's see, Page 45 of 237. And it looked at the hydrodynamic calibration locations -- and that's for DSM2. And, actually, Steamboat Slough, Sutter Slough, and Miner Slough and Cache Slough flow and stage data was not included in DSM2 recalibration, and I wonder why.

WITNESS NADER-TEHRANI: I don't -- this is from a while back. I don't remember the specifics.

That 2009 was not a full calibration. It was a -- what we call a "mini calibration." And I think beyond that I don't remember the specifics as to -- we did not intentionally leave any place out. And -- yeah.

Armin, do you recall any?

WITNESS MUNEVAR: (Shakes head negatively)

WITNESS NADER-TEHRANI: So beyond that, I can't provide anything.

MS. SUARD: So has there been a recalibration

since 2009, since we're seven years later?

WITNESS SMITH: Yes. We did do a recalibration of the model due to some model code changes and changes in datum where we felt like the changes were enough that we needed to revisit the calibration and validation.

MS. SUARD: Did that include Steamboat Slough, by any chance?

WITNESS SMITH: I am -- usually Steamboat Slough is analyzed because that is a big flow split, but at this point in time, I can't remember it. I can't recall it, so I can't say for sure.

MS. SUARD: Okay. Thank you.

WITNESS NADER-TEHRANI: There's one thing. I'm not sure in fact that -- I believe there is a flow gauge at Steamboat, but I'm not sure how far it goes back. Perhaps that may have been a consideration.

MS. SUARD: You call it a "flow gate"?

WITNESS SMITH: Gauge.

WITNESS NADER-TEHRANI: Flow gauge.

MS. SUARD: Yeah. There is a gauge.

WITNESS NADER-TEHRANI: I know there is a gauge now, but I don't know how far back it goes. I am just -- and this is -- I don't know. I'm just saying perhaps.

MS. SUARD: Okay. So I actually -- I'm just going to switch, and I'm going to go now to, actually, the material that was provided to me so that we have to go switch back to Slide 9, please. And this is just a screen print of CDEC, and that's where the gauges are.

And, you know, for lay people like me in the water world, I have been trying to understand flow. This website's a really important website, especially when there's those extremes like too much flow getting ready if there is floods or -- but there's also our concern about when it too low a flow.

So I wanted to put for reference, here's the gauges. And then let's see.

So is CalSim II -- and I think this is probably a repeat -- based on actual flow numbers from CDEC? Yes or no?

WITNESS NADER-TEHRANI: You mean DSM2; is that correct?

MS. SUARD: Okay. DSM2.

WITNESS NADER-TEHRANI: Can you explain what you mean? I don't think the question is very clear to me.

MS. SUARD: Okay. So is DSM2 based on flow data from CDEC?

WITNESS NADER-TEHRANI: I guess we use their

observed data from CDEC as a way to validate the results of the DSM2.

MS. SUARD: Okay.

WITNESS ANDERSON: So I'd like to -- okay. As written, the question says, "Is CalSim based on actual flow numbers from CDEC?" And the answer to that question is no.

If we're changing the question to is DSM2 based on the flow numbers from CDEC, it is when it's run in a historical mode but not when it's run in a planning mode such as was done for WaterFix. Then the flow numbers come from CalSim.

MS. SUARD: Okay. Next slide please, Slide -- is that Slide 11? There we go.

When the modeling was done -- and then after this we're going to what was provided by DWR.

We see three intakes, and then the green dot -- oh, by the way, this is from Water Board's water rights -- this happened to come from Bay-Delta conservation plan for WaterFix. So you can see it's their errata page. The link is on there. I just want to be able to reference that.

CO-HEARING OFFICER DODUC: Just reading your question, Ms. Suard, I believe this was addressed already, but go ahead and confirm again that there is

no fourth intake.

MS. SUARD: Okay. So I'm asking what is Delta water facilities, and was it included in the modeling for WaterFix? So first thing, what is that green dot? What does it represent?

WITNESS MUNEVAR: I can't speak to the green dot, but I can speak to the modeling, and the modeling only includes the three intakes.

MS. SUARD: Delta water facilities, is that a USBR project?

MR. BERLINER: Maybe we can be helpful here.

MS. SUARD: Excuse me?

CO-HEARING OFFICER DODUC: Mr. Mizell.

MR. MIZELL: There was testimony provided in Panel 1 as to what the Delta water facilities are. That's the existing water diversion point in DWR's permits as they stand today. There is no facility planned to be built at it in this project and, therefore, it's not part of the California WaterFix.

MS. SUARD: Is there any water being diverted from that point? It sounded like the answer's no.

MR. MIZELL: Again, we can -- object to being asked and answered, but provide the answer that was provided with Ms. Pierre's testimony. There is no facility currently located at this diversion point.

CO-HEARING OFFICER DODUC: And there is none proposed.

MR. MIZELL: And there is none proposed.

MS. SUARD: In any other name, there's none proposed?

CO-HEARING OFFICER DODUC: Please move on, Ms. Suard.

MS. SUARD: Okay. So Page 12. This was the information that I had requested because I was definitely having difficulty trying to gather information, and I really appreciate that the modeling staff and Mr. Mizell took the time.

I actually got a text last night at 3:00 in the morning that this stuff was -- this information was available, and got up here early and met with --

CO-HEARING OFFICER DODUC: And your question is --

MS. SUARD: Okay. So can we go to that next slide, please?

I have questions about what was provided.

No. I'm sorry. This is the -- that other -- the graphic provided by -- the other file. There we go.

So this is what was provided by DWR modelers. And I do want to say that it was pointed out to me that

it shouldn't say "current climate." It should say -- what was the word used? -- "current climate assumptions." And I'd asked for information for dry year and critical year, basically what's the bottom line, what's going to be left in the river.

There is a little -- up on the upper right, I just -- it -- there is a, you know, exemption about the information provided. And I wanted to --

CO-HEARING OFFICER DODUC: Ms. Suard?

MS. SUARD: Yes.

CO-HEARING OFFICER DODUC: We need to -- has this been marked as an exhibit for you? And we need to identify it for the record.

MS. SUARD: You know, I would like this to be marked as an exhibit. This is provided by the DWR modelers. I cannot attest to its accuracy, but I think it's wonderful they provided this.

CO-HEARING OFFICER DODUC: So shall we call this SHR --

MS. SUARD: I would have to say, to play it safe, 280; SHR-280.

CO-HEARING OFFICER DODUC: All right.

MS. SUARD: And I just -- okay. And I just -- I wanted -- I really appreciate this effort, but I was actually hoping to get the information in more of an

Excel spreadsheet format. I could tell that to make this model, to make the graphic, there has to be the baseline numbers.

CO-HEARING OFFICER DODUC: Ms. Suard, I need to know what is the question here?

MS. SUARD: I would request that I be provided with these numbers in a spreadsheet format. I did ask Mr. Mizell about that, and he said that I should go to CDEC and get the information. And so that brings me to CDEC questions.

MR. MIZELL: I'd like to make a clarification on the discussion we had this morning.

When Ms. Suard was asking about projections on the California WaterFix, I indicated that the raw data, the spreadsheet, in her terms, is available through the modeling results that have been posted for several months now.

My expectation was that she wanted more than simply raw numbers because they have been available for so long. So our staff put together this analysis in what we believed to be a clear and understandable format comparing all of the various scenarios at each of the locations.

I was further asked about what the existing conditions would be for the various flow splits, at

which point I indicated that the existing reporting numbers for all of the flow gauges are reported on CDEC, and that is also available to the public and is provided in a spreadsheet-type format.

CO-HEARING OFFICER DODUC: All right. So, Ms. Suard, what is your question of these witnesses?

MS. SUARD: I still am -- I am requesting the information for flow on Delta Cross Channel because that was omitted from this. That's the first one.

CO-HEARING OFFICER DODUC: So hold on.

To the extent that you would like to have information that was submitted in May from the outputs from the various modelings that were conducted, Mr. Mizell yesterday offered -- I believe it was one of the parties' technical assistance in accessing that data.

MR. MIZELL: That is correct.

CO-HEARING OFFICER DODUC: I would assume he would also extend that offer to you as well as any other parties.

And I would ask that again you work out any requests for data with Petitioners.

I want to redirect you to the cross-examination of these witnesses. Do you have specific questions for them based on the modeling work

that they did and presented for the petition?

MS. SUARD: Yes.

CO-HEARING OFFICER DODUC: Let's go there, then.

MS. SUARD: These are related to pulling down the information from CDEC and the website that was referenced and being able to work with that information because that brought up questions as well --

CO-HEARING OFFICER DODUC: Are you going to ask --

MS. SUARD: -- about the data.

CO-HEARING OFFICER DODUC: Are you going to ask them --

MS. SUARD: Questions.

CO-HEARING OFFICER DODUC: -- questions about how they did that modeling, how they did that analysis?

MS. SUARD: Nope. It's about data. It's about -- and it applies to how we could -- let me just give an example.

Could you go to Page 15, please?

CO-HEARING OFFICER DODUC: 15 of?

MS. SUARD: Of my -- no, that's not 15. could you go to the next page? There you go. That's it.

So when you download the data in cfs, if I want to know how many acre-feet might be exported or

delivered, I found that in 2000 when CalSim was developed, the cubic feet per second equaled 646 and 200-and -- or 320 gallons per day. But USGS has a different number. It's slightly different. But it can result in --

CO-HEARING OFFICER DODUC: So is this your question for these witnesses?

MS. SUARD: My question is for the modelers. Which -- which formula would you use to -- if you wanted to convert between cubic feet per second to gallons per day?

WITNESS NADER-TEHRANI: I would say they are both close enough.

MS. SUARD: Excuse me?

WITNESS NADER-TEHRANI: I would say they are both close enough.

MS. SUARD: They're both close enough. Okay. That's an answer.

CO-HEARING OFFICER DODUC: All right. Next question.

MS. SUARD: The next page, please. Okay.

So this actually is from the water rights documentation, DWR_316.

CO-HEARING OFFICER DODUC: All right. It is Page 16 of your presentation.

MS. SUARD: Yes.

CO-HEARING OFFICER DODUC: Can the witnesses please read the questions in red.

MS. SUARD: So does one acre-foot equal 200 -- 327,518 gallons, or does it equal 235,900 gallons?

WITNESS NADER-TEHRANI: I don't know. I can calculate it if you give me a few minutes.

MS. SUARD: I would like to know the answer because I'm actually trying to do some modeling and I'm finding a conflict between simple things like formulas.

CO-HEARING OFFICER DODUC: Ms. Morris?

WITNESS NADER-TEHRANI: I would say they're -- once again, I believe they're very close.

MS. MORRIS: I object again as to the relevance, and also there's not enough information. It could be simply a rounding error on the conversion or a rounding difference. One might have carried out four versus three, and that would cause a mistake like this. So it seems irrelevant to this project.

MS. SUARD: I'm sorry. I do not feel it's irrelevant, because when you multiply these gallons times the cfs of flow that we're talking about, it actually comes out to -- the difference is basically all the Delta -- in-Delta use. I mean, numbers can be inflated or deflated if you use the wrong formula.

CO-HEARING OFFICER DODUC: All right, Ms. Suard. You've asked your question, and the answer is that he does not know. So let's move on.

MS. SUARD: Okay. Page 17, please.

So when -- this is for modelers. Did any of you yourselves pull down the CDEC data to develop DSM2?

WITNESS SMITH: So let me get a minute to familiarize myself with this graph.

CO-HEARING OFFICER DODUC: Actually, answer the question she just asked.

WITNESS SMITH: Well, I do pull down data from CDEC, but not -- I wanted to see what time period because it could be -- it may not have been at the time period I looked at.

CO-HEARING OFFICER DODUC: Where are you going with this question, Ms. Suard?

MS. SUARD: So this -- for reference, this -- my Page 17 is a screen print from data that I pulled down from CDEC and then put onto an Excel spreadsheet from 3/26/14. And the words "missing data," I added that to that because I found that there was gaps in the data. That was a little bit hard to find, but I was actually trying to understand real flow.

And so I'm just wondering when these modelers -- so, Ms. Smith, when you pull down data, do you ever

look for gaps in the data?

WITNESS SMITH: Yes. When we're running historical simulations or if we're doing validations -- when we're running historical simulations, we're usually just concerned with Freeport. If we see gaps within the data, if they're on boundary conditions, we will find a way to fill them.

We'll maybe look for adjoining stations or find -- looking at whether or not it just could be filled simply. If it's for validation, we just leave those out because we know those are missing. We don't have to when we're comparing for those time periods.

So yes, we definitely look what data's available.

WITNESS NADER-TEHRANI: May I add one thing?

The values that are in CDEC are not relevant to the information that we presented to the Board. We use -- we do not use historical numbers we use the results from CalSim. So the missing data in CDEC does not affect our ability to run the models because there is nothing missing. There is no missing data when we use CalSim.

CO-HEARING OFFICER DODUC: Moving on, Ms. Suard.

MS. SUARD: Okay. So we can go right past

Slide 18 because it's another day of data gaps.

So this is Slide 19. It actually is a screen print of WaterFix from the Draft BA. It's Page 32. And it actually talks about a calibration period based on hydrology, exports, and observed data available. And it analyzes, I believe -- what does this chart analyze? Let me just ask that.

WITNESS NADER-TEHRANI: I have to see the entire document to answer that question. This is my first time looking at it.

MS. SUARD: Okay.

CO-HEARING OFFICER DODUC: Are you able to answer this question that is on the top of this page?

MS. SUARD: Yeah, I'll ask the question. If you look at 2006 water year, which was a wet year, that's what -- it says 2006, and then there's a W for "wet year." It talks about annual exports and cfs. And it says, "The flow data is fair." Do you see that?

WITNESS NADER-TEHRANI: I see that, mm-hmm.

MS. SUARD: Okay. My question is why would flow data be considered fair when no data for the Delta Cross Channel and Georgiana are not on CDEC? And I give the reference where it gives comments, and it says that they're going to put up 2006 and 2007, but it's not really there.

CO-HEARING OFFICER DODUC: Let's stop there. Are you able to answer this question?

WITNESS NADER-TEHRANI: No, I cannot.

MS. SUARD: So do you know who assessed that data as fair?

WITNESS NADER-TEHRANI: I do not.

WITNESS ANDERSON: And again, this is referring to historical data not to what was presented for WaterFix.

CO-HEARING OFFICER DODUC: Understood.

Move on, please, Ms. Suard.

MS. SUARD: Okay. Page 20, please.

So this is a chart from the California water plan update that's the lower part of the chart. I brought this up before. And this chart was based on day flow that CDEC can -- I don't know if -- oh, I'm sorry. Is that Page 20? We have to go to Page 20. There we go.

This chart, I did bring it up before. This is a screen print from 1/16/2014, and the chart above it is the numbers trying to make it clear to read. And I'm bringing this up because I wanted to note that --

CO-HEARING OFFICER DODUC: What is your question, and how is this related to the work and testimony this panel provided?

MS. SUARD: The chart says that Delta outflow in 2008 was only about 1.5 million acre-feet.

Is that reflected in the updates to DSM2?

MR. MIZELL: I'm going to object to the foundation. The upper half of this page has no reference, and it looks to be something more than simply a reiteration of the fuzzy numbers contained in the bottom half of the page.

MS. SUARD: I -- actually, I agree. That's fair. I realize there is more to this on there. So that's fine.

CO-HEARING OFFICER DODUC: All right. So you're moving on?

WITNESS ANDERSON: Delta outflow is not an input to the DSM2 model. It is something that is -- will be calculated.

The flows into the Delta from the tributaries are the inputs into DSM2. And then it combines them all together and mixes them with the tides. And then you can analyze the Delta outflow from the model, but the Delta outflow is not an input to the model.

CO-HEARING OFFICER DODUC: Move on, please, Ms. Suard.

MS. SUARD: Okay. So Page 21 is -- at the top it's a screen print of the same data that was actually

changed by DWR. There's no errata. I did the screen print on 8/10/16.

CO-HEARING OFFICER DODUC: How does this apply to the DSM2 modeling that was done by this panel?

MS. SUARD: My understanding is that DSM2 had a -- an update in 2009. And I am wondering if any of the data from CDEC was included in that update?

WITNESS MUNEVAR: I believe all the data sources that were utilized in that updated calibration described in 2009 are indicated in the -- Gwen tells me the attachment. They're indicated in the calibration attachment to Appendix 5A. There's a detailed description of that recalibration.

MS. SUARD: And that detailed description did indicate that it used numbers from CDEC through 2008, didn't it?

WITNESS BUCHHOLZ: It appears that way. I'm reading it now from Appendix 5B, DSM2 Attachment 1, which you've cited before. This is from the biological assessment.

MS. SUARD: So I'm --

WITNESS BUCHHOLZ: This would have been a time thing.

MS. SUARD: So I'm not sure -- my question is which set of CDEC numbers up until 2008 was used? Do

you know?

WITNESS NADER-TEHRANI: We mainly used the data needed to run the model. That's the inflow through all the major tributaries to Delta. That includes Sacramento River, San Joaquin River, and all the other tributaries.

We used the CDEC, you know, values at other locations as a way to validate the results. We don't compute Delta outflow. It's basically will be calculated by the model. It's simply kind of the algebraic sum of all the inflows and out- -- you know, the diversions and the tidal effects. Those are all handled inside the model.

MS. SUARD: To do those algebraic calculations, don't people need to use consistent numbers, for example, converting cfs to gallons?

WITNESS NADER-TEHRANI: We do not do that. The unit that we use in the model are always cfs. We don't -- we never have a need to use gallons.

MS. SUARD: When you convert cfs to thousand acre-feet, how do you do that?

WITNESS NADER-TEHRANI: That is done in CalSim, and there is a conversion unit that goes from acre-feet to cfs.

MS. SUARD: And that's where I found two

different --

CO-HEARING OFFICER DODUC: They are close enough. I think we need to move on.

MS. SUARD: Okay. So I'm going to -- actually, just a few questions, just more general.

CO-HEARING OFFICER DODUC: And you are about to run out of time.

MS. SUARD: Yeah.

CO-HEARING OFFICER DODUC: What additional areas are you exploring?

MS. SUARD: I just -- let's see. Just the water quality issue. Just the CWF is supposed to have the same Delta water quality requirements, and I understand that -- that's based on surface water quality, is that correct, in the models?

WITNESS NADER-TEHRANI: Yes, that is correct.

MS. SUARD: So there's been recent references to knobs, turning knobs on and off, or turning more water on and off in different areas. And then you talked about boundaries.

Has there been any analysis of the most extreme boundary, meaning -- I believe Boundary 2 means taking more water out of the Delta; is that right?

WITNESS NADER-TEHRANI: I believe it's the opposite.

MS. SUARD: Okay. Boundary 1 is diverting less water off the Sacramento River, and Boundary 2 is --

WITNESS NADER-TEHRANI: No, it's the opposite. Boundary 1 has the highest --

CO-HEARING OFFICER DODUC: Boundary 1 is less outflow. Boundary 2 is more outflow.

MS. SUARD: Okay. Outflow and off the Sacramento River are two different things. That's what I'm trying to understand.

CO-HEARING OFFICER DODUC: Let's -- you are out of time. So is this your last topic of questions?

MS. SUARD: Yes, last topic.

CO-HEARING OFFICER DODUC: About five minutes?

MS. SUARD: Or less.

CO-HEARING OFFICER DODUC: Let's give her additional five minutes and --

MS. SUARD: I'd like to understand the boundaries as it relates to North Delta and Sacramento River flow. Outflow from the Delta is a different thing than Sacramento River and Steamboat Slough flow or North Delta flow, so.

CO-HEARING OFFICER DODUC: Based on your modeling of Boundaries 1 and Boundary 2, are you able to provide any --

WITNESS NADER-TEHRANI: I'm sorry.

CO-HEARING OFFICER DODUC: -- provide any assessment of Steamboat Slough's --

MS. SUARD: Steamboat Slough and lower Sacramento River to Rio Vista. How's that?

WITNESS NADER-TEHRANI: Well, what happens between Boundary 1 and Boundary 2 is the different volumes of water is taken from the river, and that has an influence on the flowing. Sutter and Steamboat and all those are all evaluated in the model.

CO-HEARING OFFICER DODUC: Can you provide any general assessment to Ms. Suard regarding the difference between Boundary 1 and 2?

WITNESS NADER-TEHRANI: The graphical presentation we presented to her includes what -- I believe representations of flow at the different areas including Steamboat, Sutter Slough, and all other areas.

CO-HEARING OFFICER DODUC: Are you able to give her a narrative description of that impact?

MS. SUARD: Thank you.

CO-HEARING OFFICER DODUC: Right now?

WITNESS NADER-TEHRANI: Yeah, sure. Maybe can we have that picture?

CO-HEARING OFFICER DODUC: Bring it back up?

MR. MIZELL: Mr. Long, that would be the extra file.

WITNESS NADER-TEHRANI: So the first plot that you see out there is Sacramento River upstream of Sutter and Steamboat. So that means it's downstream of the North Delta diversion. So that's the amount of water that's left in the river. You can think of that as the bypass flows.

MS. SUARD: Excuse me. So this is existing plus climate change; is that correct?

WITNESS NADER-TEHRANI: These are the no action alternative to the left. The second bar represents Boundary 1. The green bar represents H3. The purple, H4. And the gray represents Boundary 2.

MS. SUARD: Okay. And again, the no action alternative, I believe that was described to me as existing plus climate change; is that correct?

WITNESS NADER-TEHRANI: That's the no action alternative as described by Armin but projected at 2025, 2030; climate change and sea level rise.

WITNESS ANDERSON: I think the confusion in the heading is that it talks about the dry-year average for the Sac Valley index for current climate. I think they're saying to determine which years were the dry years, they used the current indexes that indicate

which years are dry years and wet years, and didn't reevaluate in the model for those years what years were dry years. They used the historical 82-year sequence. In the historical sequence, it was a dry year. They pulled it as a dry year.

MS. SUARD: So this was --

WITNESS ANDERSON: But the results themselves are from the modeling that is all at the future climate.

MS. SUARD: And was this done with CalSim or with --

WITNESS NADER-TEHRANI: DSM2.

MS. SUARD: DSM2? Okay.

WITNESS SMITH: But let's clarify that CalSim provided the inflows, the boundary conditions for DSM2 for this.

WITNESS NADER-TEHRANI: Just quickly, the purple bar in this case roughly translates into about 11,000 cfs. That represents for the month of October for -- only for the dry year. That's the average flow. So think of that as the bypass flow.

You remember the requirements were 7,000 cfs in this month. And it does reflect that in fact the model provided -- well, that one is for the no action, doesn't have the intakes. You go see the red line,

that's the 7,000 that I was referring to.

CO-HEARING OFFICER DODUC: Thank you.

WITNESS NADER-TEHRANI: They're about the same for all the other runs. And what you see below are at different locations, how no action compares to the four different alternatives.

CO-HEARING OFFICER DODUC: Thank you.

MS. SUARD. Okay. So just this one other question since this was brought up.

How does flow get into Steamboat Slough if there is a flow barrier?

WITNESS NADER-TEHRANI: Well, apparently it does because the model results show that there is flow in there.

MS. SUARD: But this was based on pre 2009 data?

WITNESS SMITH: So I was looking at the results of the graphs we gave you. And the -- in terms of the change during that time period, at least at the northern part, there was actually a decrease in that berm. So there was actually more flow able to come through, at least on the north side, after 2009. Just to let you know on that.

MS. SUARD: Is that because of the pulse flows?

WITNESS SMITH: I do not know why, but the bathymetry does show that there was a slight change, but it was not in the direction of blocking it but actually kind of slightly going the other way.

MS. SUARD: Do you happen to know why -- sorry, one last question -- why flow on Sutter Slough that used to go on down to Steamboat Slough is now diverted over to Miner Slough? There's a drastic change in there right now.

WITNESS NADER-TEHRANI: Please say that again.

MS. SUARD: Would you know why flow from Sutter Slough is diverted on to Miner Slough in a much higher capacity than historically? It used to flow -- most of the flow from Sutter used to reach Steamboat Slough, and now your own model shows that it goes into Miner Slough.

WITNESS NADER-TEHRANI: I can't answer that.

MS. SUARD: You don't know why?

WITNESS NADER-TEHRANI: I don't know because I don't know what the history has shown. I don't have that information.

CO-HEARING OFFICER DODUC: All right. Thank you. Thank you, Ms. Suard.

MS. SUARD: I want to thank you guys for doing this. This really does help a lot.

CO-HEARING OFFICER DODUC: Thank you. You're very welcome.

So are we doing okay? Do we need to take a break? Five-minute break. All right. We will resume at 2:40 -- I mean, sorry, 2:50.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. I'll ask Ms. Womack to come up. And just for everyone's information, we'll have Ms. Womack, then Mr. Brodsky, and then Ms. DesJardins. And that will complete our cross-examination of this panel.

We will likely be here until 5:30 or 6:00 or so, depending on how long it take, but not longer -- no later than 6:00 o'clock.

Ms. Womack?

MS. WOMACK: Hi there. You asked me to report back to you. And so it's Friday, and I met with four representatives of DWR. And I've found out that to get victim compensation that I requested in 2012, I will have to sue them because that is the level. And so that's the process, and which I think is kind of mean. I mean, as a person I have to sue to get money that has cost me from the State, the operations. This is all related to operations.

So -- and I found out, Ms. Heinrich, that you

told me very specifically when they showed the map that that did not mean they would take the whole amount of land. Correct? You told me that.

CO-HEARING OFFICER DODUC: Okay. Hold on. Hold on. I'm glad you had the meeting with DWR. I hope there will continue to be discussions so that you can reach an understanding in terms of what's happening with your property.

My question for you right now is are you planning on conducting cross-examination of the modeling panel?

MS. WOMACK: Could I just tell Ms. Heinrich because she was so --

Because you were so nice in saying this doesn't mean this, but they told me they are taking all my property. So I wanted you to know that because that is what they told me. They said you were wrong. So just to let you know that.

I want -- beyond that I would be glad to move on. And the last thing -- and they're going to look into victims' compensation, why Mark Cowin hasn't -- he was requested by Victims' Compensation to talk to me in 2012, and he didn't.

But beyond all that, I am not going to do modeling because modeling, you know, it is what it is

at my point at the -- at the Clifton Court Forebay. I get whatever shows up. So modeling doesn't seem to make a difference.

CO-HEARING OFFICER DODUC: All right.

MS. WOMACK: That is me for today. But I did want Ms. Heinrich to know that you were wrong. So thank you.

CO-HEARING OFFICER DODUC: That's the only mistake you're allowed this year, Ms. Heinrich.

And thank you, Ms. Womack, for that report.

Mr. Brodsky, you're up for your cross-examination. And, Mr. Brodsky, assuming that your cross-examination will take longer than half an hour, please be advised that I need to take a break for the court reporter. And so if there's a good time to break around 3:30-ish or so, I would like to do so.

And by the way, congratulations for being the first attorney to have got and comply with my casual Friday announcement. Thank you.

MR. BRODSKY: You're welcome.

CROSS-EXAMINATION BY MR. BRODSKY

MR. BRODSKY: So I'd like to spend just about five minutes following up on the Mr. Eichenberg's questioning about the utility of the model for comparative purposes.

CO-HEARING OFFICER DODUC: And what other, since you've -- what other topic areas will you be exploring?

MR. BRODSKY: The other topic areas is water quality impacts at Discovery Bay. And I'm going to go into the difference between using monthly mean averages for EC and using daily reports for EC.

CO-HEARING OFFICER DODUC: So I'm sure you know, we did explore that a little bit already. So you won't be repeating.

MR. BRODSKY: I'll keep it brief.

CO-HEARING OFFICER DODUC: Okay.

MR. BRODSKY: And a couple of quick questions about reducing reliance on the Delta and the way that the modeling treats D1641; those will be brief.

CO-HEARING OFFICER DODUC: Okay. Thank you.

MR. BRODSKY: Okay. So if we could pull up DWR-5, Page 7.

MR. OCHENDUSZKO: And for clarity of the record, we're now pulling up DWR-5 Errata.

MR. BRODSKY: And I can't see the name tags. I believe it's Mr. Munevar.

WITNESS MUNEVAR: Munevar, yeah.

MR. BRODSKY: Munevar. Okay. Thank you.

So we see here that your presentation CalSim

II is most appropriately used for comparative purposes and not for predictive purposes, and it's a planning tool and should not be used to replicate historical conditions. And I think we've been consistent on that throughout the hearings, right?

WITNESS MUNEVAR: Correct.

MR. BRODSKY: Okay. And then if we could have DWR-71 at Page 13. And looking at Lines 2 to 8 there, it says that CalSim II results are intended to be used in a comparative manner which allows for assessing the changes in the SWP/CVP system operations and resulting incremental effects between two scenarios. The models should be used with caution where absolute results are needed in instances such as determining effects based on a threshold, prescribing seasonal operations, or predicting flows or water deliveries for any realtime operations."

So my question to you is, in your slide and your written testimony that we just read there, you make a distinction between using the model for absolute versus comparative analysis; is that right?

WITNESS MUNEVAR: I do. Correct.

MR. BRODSKY: Okay. Very good. And then if we can take a look -- scroll down to Line 18, and at Lines 18 to 19 it says there, "Because of the technical

limitation of the models, they cannot reliably predict specific operations." And I guess I'm just repeating what you just said, but the model is not reliable for predicting specific outcomes; is that correct?

WITNESS MUNEVAR: That's correct. And the second sentence said, "Should be used in estimating trends in a comparative framework," so, correct.

MR. BRODSKY: Very good. Thank you.

So is it your opinion that the model's reliability in comparative use is not dependant on its reliability in predicting specific outcomes?

WITNESS MUNEVAR: I think for the application here where we're comparing the only changes between a no action and a project -- and the California WaterFix project, it is accurate in providing the incremental changed between the WaterFix and the no action.

MR. BRODSKY: And the fact that it's not reliable or accurate for predicting specific outcomes, doesn't affect your opinion in that regard?

WITNESS MUNEVAR: Well, it has not been applied in an application to attempt to predict specific outcomes. It's in a planning mode.

MR. BRODSKY: All right. If it were not accurate in predicting specific outcomes, would that affect its ability to be accurate in predicting

comparative analysis?

WITNESS MUNEVAR: I don't understand the question because it hasn't been used in an application to attempt to predict accurate or historical outcomes.

MR. BRODSKY: I guess the question is don't we need to know the model is accurate in predicting specific outcomes in order to be able to rely on it in comparative scenarios?

WITNESS MUNEVAR: The application of CalSim II in particular and the hydrology which drives a lot of CalSim II is developed based on historic gauge information. And using the gauge information as our best assessment of what accurate -- what historically happened, we then build the hydrology from that and make adjustments for 2030 and for climate change.

So to the extent that that historic information is utilized in representing the baseline hydrology within CalSim II, I think it is accurate in terms of comparative purposes.

MR. BRODSKY: But it can't predict -- it's not accurate for specific outcomes; you already said that. So that's been asked and answered, right?

WITNESS MUNEVAR: (Nods head affirmatively)

MR. BRODSKY: Okay. And you believe that that's a reasonable assumption, that it can be accurate

for use in a comparative sense, even though your own testimony is that it's not reliable to predict specific outcomes? Based on your education and experience and common practice in your industry?

WITNESS MUNEVAR: Yes, I -- I think that's true because of -- my statement here was it wasn't intended to provide specific outcomes; it was intended to be used in a comparative mode.

MR. BRODSKY: Okay, thank you.

Can we go to PFCAA-20 [sic].

And to Page 9, please.

Okay. And at that first paragraph, under 6.1 the first sentence says, "Modelers sometimes make a distinction between the use of a model for absolute versus comparative analysis."

That's exactly what you did, right?

WITNESS MUNEVAR: Well, we've used it in the comparative analysis, yes.

MR. BRODSKY: You just testified a minute ago that you made a distinction between the use of the model for absolute versus comparative analysis.

Should we have the court reporter read it back?

Can we go back to that?

CO-HEARING OFFICER DODUC: Rather than doing

that, Mr. Brodsky, what is your point here? What is your question here?

MR. BRODSKY: My point is I'm going to -- I'll just continue.

CO-HEARING OFFICER DODUC: Please.

MR. BRODSKY: The point will become clearer.

CO-HEARING OFFICER DODUC: Good.

MR. BRODSKY: Can we have issues PFCAA-20 back?

CO-HEARING OFFICER DODUC: Yes, I remember spending quite a bit of time on this paragraph.

MR. BRODSKY: Okay. I asked you -- so in your slide in your testimony, you make a distinction between using the model for absolute versus comparative analysis at the beginning of my examination, and you answered that's correct.

Are you change your testimony now?

WITNESS MUNEVAR: I don't recall whether it was absolute or predictive. I thought we were talking about predictive in our discussion.

MR. BRODSKY: Okay. Could we go back and read that testimony?

CO-HEARING OFFICER DODUC: If you can do that easily.

WITNESS ANDERSON: Or we could bring the

slide up again and read the words on the original slide.

MR. BRODSKY: I want his testimony read back from the transcript. That's why we have a court reporter.

(Record read)

MR. BRODSKY: This first sentence says, "Modelers sometimes make a distinction between the use of a model for absolute versus comparative analysis." And that's exactly the distinction you made as you answered my question the first time; isn't that right?

WITNESS MUNEVAR: That appears to be correct, based on that --

MR. BRODSKY: Very good.

WITNESS MUNEVAR: -- my statement.

MR. BRODSKY: Let's go to the next sentence.

In an absolute analysis one runs the model once to predict an outcome. In a comparative analysis, one runs the model twice, once as a baseline and the other with some specific change in order to assess changes in outcome due to the given change in model input configurations.

That's how you're using the model for your comparative analysis; is that right?

MR. MIZELL: Objection, vague. Is he

referring to the "run it once" or "run it twice" sentence he just read?

MR. BRODSKY: Run it twice sentence. Thank you for the clarification.

WITNESS MUNEVAR: Yes, in terms of run a baseline and then running a change a second time or in this case a second, third, fourth, and fifth time in comparison to a no action.

MR. BRODSKY: Okay. And your previous testimony was that it was your opinion that the model's reliability in comparative use is not dependant on its reliability in predicting specific outcomes and that you thought that was a reasonable assumption in your industry; is that what you testified to?

WITNESS MUNEVAR: I believe I testified that's typically how models are used to run a baseline and then run a scenario in which the only change from the baseline is the proposed -- is the project or the action to be evaluated.

MR. BRODSKY: Okay. Let's go back and read that testimony. So the question was --

CO-HEARING OFFICER DODUC: Which testimony?

MR. BRODSKY: We're going back -- my question is we're going back -- after we looked at DWR-71.

CO-HEARING OFFICER DODUC: Let's stop for now,

because she can't record this as well as look for --

MR. BRODSKY: Okay. Shall I turn my microphone off?

(Record read)

MR. BRODSKY: So what I just heard is that it was your opinion that, even though the model is not accurate for predicting specific outcomes, that doesn't prevent it from being accurate in use in comparative analysis.

And now I want to read you this next sentence. "The suggestion is that, while the model might not generate a highly reliable absolute prediction because of the models and errors [sic] specification and/or estimation" --

(Reporter interruption)

MR. BRODSKY: I'm sorry.

"...errors in model specification and/or estimation, nevertheless, it might produce a reasonably reliable estimate of the relative change in outcome.

And what that sentence just said, isn't that the same thing as what you testified to regarding the difference between absolute prediction and comparative use?

WITNESS MUNEVAR: Well, the providing the reasonable estimate of the relative change in outcome

is what I testified to.

MR. BRODSKY: And that's true, even though it might not generate a highly reliable absolute prediction?

WITNESS MUNEVAR: I'm not trying to be evasive, but the model has never been prepared to provide an absolute -- a historic validation or calibration. So there's not that assessment that I can compare back to.

MR. BRODSKY: And I understand that it's never been tried to make it so that it would provide a reliable absolute prediction. We accept that.

But the question is and what you testified to and what the court reporter read back is that, even though it's the case that it's not designed to provide a reliable absolute prediction and doesn't, it still produces a reliable comparative analysis; that's your opinion. That's what you said before.

WITNESS MUNEVAR: That is my opinion, and the basis for that opinion is that the development of these models is not developed in isolation. It's done -- operator input, Reclamation, DWR staff. It attempts to be the best model in terms of the long-term planning model. So the comparative nature of it -- and there's been input from various parties, user groups,

et cetera -- to provide the model as the best basis for a long-term planning.

MR. BRODSKY: And you said that you believe that that was a reasonable assumption, that even though it didn't predict accurately absolute outcomes, that it could still be accurate and useful for comparative analysis, correct?

MR. BERLINER: Objection, that misstates the witness's testimony.

CO-HEARING OFFICER DODUC: Mr. Munevar? Do you agree or disagree?

WITNESS MUNEVAR: The application here, I believe it provides a reasonable estimate of the incremental changes between the projects, between the no action and the project.

CO-HEARING OFFICER DODUC: Mr. Brodsky, before you go further, Mr. Eichenberg spent quite a bit of time on this. I'm curious what particular difference and nuances or questioning are you exploring?

MR. BRODSKY: The difference is is that I'm showing sentence by sentence that exactly what this peer review panel said shouldn't be done is what they did.

And I'm take taking his testimony that he's giving today and answers to my questions and showing

that it's directly contradicted by this peer review.

And Mr. Eichenberg didn't go into that level of detail.

MR. MIZELL: In response that, excuse me, I'll assert that Mr. Brodsky is misrepresenting the very document that he's questioning the witness on. The document does not say it cannot be done or should not be done.

In fact, if you look at the last sentence, it tells you the qualifier. So such an absolute conclusion drawn out of this document, I think it inappropriately misleads the public.

MR. BRODSKY: Well, let's let the document speak for itself.

CO-HEARING OFFICER DODUC: Hold on. Hold on, Mr. Brodsky. Let me -- I think I appreciate where you're going because, if you remember, I had quite an exchange with Mr. Eichenberg and witnesses on this particular paragraph myself. So if you will indulge me.

MR. BRODSKY: I'm almost done, but please, you go first.

CO-HEARING OFFICER DODUC: Mr. Munevar, the modeling of the no action alternative taken alone cannot be used or should not be used as predicting

possible conditions of the no action alternative with climate change in a year 2025, correct, or 2030 or whatever?

WITNESS MUNEVAR: It should not be used in the predictive mode; it represents a reasonable representation across a wide range of hydrology.

CO-HEARING OFFICER DODUC: So it should not be.

The modeling results for -- I'll just pick one -- H3 by itself alone should not be used as a prediction for how things might be operated under H3?

WITNESS MUNEVAR: Not as a prediction.

CO-HEARING OFFICER DODUC: Then explain to me why is it that a comparison between a no action alternative and H3 is appropriate, given that there's some doubt about their standalone validity as predictive models?

WITNESS MUNEVAR: That's the only change between the no action and the H3, in your example, or H4 -- I can't remember which one you mentioned -- is the actions associated with the project.

CO-HEARING OFFICER DODUC: And on that basis, you believe that, even though as standalone, they do not serve a predictive model, in comparison, the difference is adequate enough to demonstrate the impact

of one over the other?

WITNESS MUNEVAR: Yes. And if you'll indulge me for a moment on this peer review, this peer review was developed in 2003. Subsequent to this, there was a historic validation -- or along the same lines, the same time of this, there was a historic validation run. And we had moved to 2010, at which point we included significant improvements in the model such that it is a far better no action model than perhaps it was back in 2003.

CO-HEARING OFFICER DODUC: Thank you.

WITNESS MUNEVAR: I think we have greater confidence in the -- as years go by, in the no action modeling, therefore, the comparative base is probably increasingly valuable.

CO-HEARING OFFICER DODUC: Even stronger. Got it. Thank you.

MR. BRODSKY: But your written testimony submitted that we read earlier was that it was not accurate in a absolute sense and shouldn't be relied on and shouldn't be used that way. I mean, that's your testimony. We read it from DWR-71, correct?

CO-HEARING OFFICER DODUC: And in this case, we're discussing a comparative analysis.

MR. BRODSKY: Correct, and I'm just verifying

that in an absolute sense his testimony is that it's not accurate.

CO-HEARING OFFICER DODUC: It should not be used for --

MR. BRODSKY: Right.

CO-HEARING OFFICER DODUC: -- an absolute predictive purpose. Let's move on, Mr. Brodsky.

MR. BRODSKY: Okay. And the point is, as I'll read the next section, "Suggestion is that, while the model may not generate a highly reliable absolute prediction because of errors in model specification and/or estimation, nevertheless, it might produce a reasonable reliable estimate of the relative change in outcome.

"The Panel is somewhat skeptical of this notion because it relies on the assumption that the model errors, which render an absolute forecast unreliable, are sufficiently independent of or orthogonal to the change being modeled that they do not similarly affect the forecast of change in outcome. They mostly cancel out."

And my point is that, what the Panel is skeptical of, the assumption that it can be not accurate in an absolute sense but accurate in a comparative sense, that's what the Panel's skeptical

of, and that's exactly what they did.

CO-HEARING OFFICER DODUC: And we have a difference on opinion. Let's move on.

MR. BRODSKY: Okay. So let's take an example. Let's say the model is accurate as to the effect of flow changes on EC at a flow range between 9,000 to 13,000 cfs.

But it's not accurate as to the effect of flow changes on EC between 4,000 and 8,000 cfs. So it's not -- it's not accurate in an absolute sense. That's what I'm representing to you. At one flow level, it's accurate. At the other flow level, it's not accurate. Do you follow my premise?

WITNESS MUNEVAR: I follow your premise I don't agree with the basis for that because we're talking about the DSM2 model at this point, which has calibration across a whole range of hydrologic conditions.

MR. BRODSKY: So you don't agree that this is -- so let us just say that at some parameter the CalSim model is accurate, but at another parameter it might not be accurate. Is that a possibility?

WITNESS MUNEVAR: I -- I don't believe so.

MR. BRODSKY: Well, then why did you testify that it's not accurate in an absolute sense?

WITNESS MUNEVAR: Let me -- can I clarify this for the Board here, so we -- the no action alternative is a 2030 projection, 2030 projection with climate change under a repeat of historical wet and dry sequences as adjusted for climate change.

We do not envision that any particular year, say at 2030, we will have the exact outcome of that no action.

That is the basis for my statement in terms of absolute purposes. But when we compare across the whole range of hydrology, the no action as compared the alternatives, we have confidence that the range of incremental changes are the types we would see when -- when the project is in place.

MR. BRODSKY: Right. And I think that this peer review indicates that your confidence is misplaced, and I think this is would be a good place to take a break.

MR. MIZELL: I object --

WITNESS MUNEVAR: May I --

MR. MIZELL: -- to that statement.

WITNESS MUNEVAR: -- respond to that?

MR. MIZELL: That was testimony, not a question.

CO-HEARING OFFICER DODUC: One at a time.

Mr. Mizell.

MR. MIZELL: I object to the questioner's statement in testifying on his belief as to what the peer review reveals, particularly when he omits the last sentence of the very paragraph he's reading, which is an important qualifier.

CO-HEARING OFFICER DODUC: Enough. All right.

We're done with this document, Mr. Brodsky.

MR. BRODSKY: I was saying that it was a good time to take a break if you wanted to.

CO-HEARING OFFICER DODUC: And we are done with this document.

MR. BRODSKY: Right. I am done with it.

CO-HEARING OFFICER DODUC: All right.

We will resume at 3- -- 3:40.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It is 3:40, and we are back in session, Mr. Brodsky.

MR. BRODSKY: I didn't identify myself for the record in the beginning. Michael Brodsky on behalf of Save the California Delta Alliance.

And I'd like to understand a little bit about the modeling rules, how the model makes decisions. And I think Mr. Tehrani might be the best one to ask this, but if not, just point me to right person.

So if we could take a look at SWRCB-104. And if we could go to Page 3-96, SWRCB-104, not DWR-104. That's a staff exhibit. It's the very last one in the staff exhibits, I believe. And if we go to Chapter 3, and Page 3-96.

MS. McCUE: Should we identify it for the record?

MR. BRODSKY: This is the submitted BA, I believe we were referring to as.

MS. McCUE: And I think it's the August 2016, the latest?

MR. BRODSKY: I believe that is correct.

So there are, under No. 6, operations for Delta water quality and residence time. Says, "July through September prefer South Delta intake up to total pumping of 3,000 cfs, no specific intake preference beyond 3,000 cfs."

And so my question is is that a rule under which the model operates, the modeling you did operated?

WITNESS MUNEVAR: Well, I'll answer this one. So the -- in the July, August, and September, there is a --

CO-HEARING OFFICER DODUC: Could you move the microphone closer?

WITNESS MUNEVAR: Yep, in July August and September, there is a rule to preference 3,000 cfs at the South Delta intake before diverting from the North Delta intake.

MR. BRODSKY: Okay. Thank you. And then if we could look at SWRCB-104, Page 3-84, that's our same document here, just to Page 3-84.

And this provides that, in July, August, and September, the minimum flow of 5,000 cfs is required in the river after diverting at the North Delta intakes. That's a bypass flow. And is that also a rule under which the model operates?

WITNESS MUNEVAR: That's correct, that's under the low-level pumping.

MR. BRODSKY: Okay, thank you. All right. So if we could take a look at DWR-1.

MS. McCUE: This is the corrected errata.

MR. BRODSKY: So I may be off by a page, I think, Page 8. This page here, yes.

And make the blow-up boxes go away. There we go. Okay.

So during July, August, and September, the model would be diverting the first 3,000 cfs down at Clifton Court, at the bottom of the page. And we see the tunnel as that sort of purple line -- twin tunnels

as the purple line leading up to the three new proposed intakes; is that correct?

WITNESS MUNEVAR: That's correct, but the 3,000 cfs applies to both Clifton Court and Jones pumping.

MR. BRODSKY: Good. Thank you. And then after the 3,000 cfs, the model would allow diversions to begin at the North Delta intakes; is that correct?

WITNESS MUNEVAR: That's correct, and with the caveat that I mentioned yesterday, that, assuming water could be diverted at either intake the, preference would be for the South. If there were constraints that were limiting South Delta diversions, then it could be removed from the North even before 3,000 cfs.

MR. BRODSKY: Even before 3,000. Okay. Thank you.

Okay. So let's take an example. Let's say that Sacramento River flow is 20,000 cfs at Freeport in the month of August.

And there were no constraints keeping you from diverting your first 3,000 cfs at the South Delta. Then could you divert an additional 9,000 cfs at the North Delta under those conditions, according to the rules we've just discussed?

WITNESS MUNEVAR: According to the North Delta

rules, it would be permitted. But there are many other rules that govern flows on the Sacramento River, for salinity in particular, Rio Vista flows and other conditions.

MR. BRODSKY: Okay. Could we take a look at DWR-4.

Actually, can we just go back to that last slide just for a moment.

So whatever amount that the rules would allow to be diverted at the new North Delta intakes above the 3,000 cfs would flow through the tunnels to Clifton Court and Tracy and then be diverted South of Delta from there; is that correct?

WITNESS MUNEVAR: If I understand your question correctly, yes, the diversions for the North Delta diversion are conveyed through the tunnel.

MR. BRODSKY: Right. And so absent that North Delta diversion, that water would be flowing through the Delta, through the Delta channels? Down the Sacramento River and through the Delta channels rather than through the tunnels?

WITNESS MUNEVAR: If the operations were identical.

MR. BRODSKY: Okay. All right. So if we could go to DWR-4, and Page 17.

Okay. So this is your exhibit of the D1641 Bay-Delta standard stations; is that correct?

WITNESS MUNEVAR: Just to be clear, this is Operations Panel presentation.

MR. BRODSKY: Operations Panel of DWR?

WITNESS MUNEVAR: Correct, but not my personal exhibit.

MR. BRODSKY: Okay. DWR's D1641 Bay-Delta standard stations. Okay.

So you said that, under the operating rules that we talked about, that additional 9,000 diversions with the North Delta would be possible but there might be other things that would constrain it, correct?

WITNESS MUNEVAR: Correct. Very likely other things constraining.

MR. BRODSKY: And that would likely be some D1641 requirement?

WITNESS MUNEVAR: A 1641 requirement, it could also be a cross channel gate being open will dissipate much of the flow in the Sacramento River and the Rio Vista requirement.

MR. BRODSKY: I'm sorry. Couldn't quite hear your last answer.

WITNESS MUNEVAR: A cross channel gate could be open, and the flow could be moving off of the

Sacramento River, and the Rio Vista flow requirement might be controlling.

MR. BRODSKY: Okay. So it might be the Rio Vista flow requirement or it might be a D1641 requirement. Anything else?

WITNESS MUNEVAR: I think it would depend whether -- whether there's reservoir releases being made or whether it's excess water.

MR. BRODSKY: Well, we're assuming there's 20,000 cfs flow at Freeport.

WITNESS MUNEVAR: Yes.

MR. BRODSKY: And your answer was you might be constrained whether it was excess water or if it was a reservoir release?

WITNESS MUNEVAR: Correct.

MR. BRODSKY: All right. Let's talk about the D1641 constraints that might apply. So in your experience in working with the model, if -- if it's a D1641 constraint that's limiting the amount of diversion at the North Delta diversion point, which one would kick in first?

WITNESS MUNEVAR: I think that will vary on the hydrodynamic conditions. It could be Emmaton controlling, Emmaton salinity standard controlling; it could be Contra Costa controlling.

MR. BRODSKY: Contra Costa at Rock Slough?
WITNESS MUNEVAR: Contra Costa at Rock Slough.
MR. BRODSKY: Okay. That covers that point.
So when you -- your modeling rules include obeying all of the requirements of D1641, salinity, EC, et cetera.
WITNESS MUNEVAR: And outflow.
MR. BRODSKY: Outflow. Okay. So is water temperature included as one of the compliance criteria in D1641?
WITNESS MUNEVAR: Not to my knowledge that it's part of 1641. It's not certainly something we've modeled as part of 1641.
MR. BRODSKY: Okay. So CWF might increase or decrease temperature as compared to the no action alternative, but the modeling results submitted to the State Water Resources Control Board would not report that fact?
WITNESS MUNEVAR: I think I'll let others on the Panel who have more expertise on this...
MR. BRODSKY: Okay. Good.
WITNESS BRYAN: Excuse me --
MR. BRODSKY: I'm asking about the modeling that was done for the BA that's been submitted to the Board here. Would that modeling report the effects of

temperature?

WITNESS BRYAN: I would assume that --

CO-HEARING OFFICER DODUC: Your microphone is not on.

WITNESS BRYAN: Oh.

I would assume that the BA does address temperature, but I think Ms. Buchholz could probably speak to that better than I.

WITNESS BUCHHOLZ: Could I clarify? Are we speaking about Delta water temperatures?

MR. BRODSKY: Yes.

WITNESS BUCHHOLZ: Okay. Because we handle it differently upstream versus Delta.

MR. BRODSKY: Thank you.

WITNESS BUCHHOLZ: Certainly.

The Delta water temperatures we actually handle in the -- in the biological -- in the biological assessment. We deal with -- I'm trying to remember how we do -- delta water temperatures is actually for the fisheries, so I am not as up on the fisheries as I am on the parts of the CalSim and the water parts of this. Do you have --

WITNESS WHITE: I'm fairly certain we run the monthly temperature model for the Delta, for in-Delta temperatures.

MR. BRODSKY: Can you describe that?

WITNESS WHITE: It's a monthly temperature model that takes CalSim output and looks for changes between two alternatives in Delta temperature.

MR. BRODSKY: At what point?

WITNESS WHITE: I am not certain. I will have to go back and look.

CO-HEARING OFFICER DODUC: Is this something that will be covered later in Part 2 as part of fisheries?

WITNESS BRYAN: Yes, I would imagine that it would be.

WITNESS WHITE: Because it's a fisheries issue.

CO-HEARING OFFICER DODUC: Will you flag that, Mr. Brodsky, for further follow-up?

MR. BRODSKY: Okay. We'll flag it for further follow up, just ask one more question on that.

That temperature for fisheries, maintaining cold water pool and so forth, would that be a requirement of fisheries for temperature during the summer months, for example, in August?

WITNESS WHITE: I think we might be mixing up -- Delta water temperature is run by the Reclamation temperature model. Cold water pool refers to upstream

releases.

MR. BRODSKY: Okay. So in the Delta, the requirement for temperature, would that be a requirement that you're meeting in the summer months, in August, for example?

WITNESS WHITE: I'm not certain there is a requirement for in-Delta temperatures, although it's outside my area of expertise.

WITNESS BRYAN: Yeah, there are no temperature standards in the Delta.

MR. BRODSKY: There are no temperature standards in the Delta.

WITNESS BRYAN: (Shakes head negatively)

MR. BRODSKY: Okay. Thank you.

Is turbidity included as one of the compliance criteria in D1641?

WITNESS BRYAN: No.

MR. BRODSKY: Okay. And so could CWF increase or decrease turbidity in the Delta?

WITNESS BRYAN: The way we assess that in the Draft EIR/EIS --

MR. BRODSKY: Well, just in the modeling that was done for the BA, is turbidity in the Delta addressed?

WITNESS BUCHHOLZ: If I may, it is

addressed -- again, it's part of the fisheries part, for the fish. So it will be addressed in Part 2.

MR. BRODSKY: As far as its impact on legal users of water and human uses, though, can I ask, does --

CO-HEARING OFFICER DODUC: Mr. Brodsky, I'd rather we wait until Part 2 for that.

MR. BRODSKY: Okay.

Can we take a look at SCDA-17. Okay. This is DWR-4, and I've just drawn an arrow on there pointing to the location of Discovery Bay.

(Save the California Delta Alliance SCDA-17 identified for the record)

MR. BRODSKY: And so the closest D1641 compliance point to Discovery Bay would be which one?

WITNESS NADER-TEHRANI: I believe it would be Contra Costa.

MR. BRODSKY: At Rock Slough?

WITNESS NADER-TEHRANI: That's correct.

MR. BRODSKY: And in your opinion would that probably be the best proxy for Discovery Bay that we've got?

WITNESS NADER-TEHRANI: My experience looking at water quality along Old River is that EC will go down as you go closer to Clifton Court. So I would

expect the EC at the Old River, where it's closest to Discovery Bay, would be somewhat lower than that of Contra Costa Canal.

MR. BRODSKY: Okay. Can we go to SCDA-13.

(Save the California Delta Alliance SCDA-13 identified for the record)

MR. BRODSKY: This is downloaded from CDEC. It's a map of monitoring stations within the Delta. Rock Slough is shown up near the top there that we just discussed. And there's another station close to Discovery Bay there, labeled as "ECD." Are you familiar with that station, ECD?

WITNESS NADER-TEHRANI: I see that. But that's not included in the model.

MR. BRODSKY: And do you have any other familiarity with what that station is or --

WITNESS NADER-TEHRANI: No.

MR. BRODSKY: You do not. Okay.

Do you know if -- does anybody know if that Station ECD was used to calibrate the 2015 CalSim model?

WITNESS NADER-TEHRANI: I don't believe so, but -- Armin?

It wouldn't be something that would control CalSim, in my opinion, because CalSim is trying to meet

water quality objectives at few locations which does not include that location that you just described.

MR. BRODSKY: Okay. Thank you.

WITNESS MUNEVAR: And for the record, just to be clear, this would be in the DSM2 model, not in the CalSim model.

MR. BRODSKY: Okay. Do you know if it was used to calibrate any of the models?

WITNESS NADER-TEHRANI: That location that you're showing is not -- I believe is not even part of DSM2.

MR. BRODSKY: Okay. And can we go to SCDA-12.

(Save the California Delta Alliance SCDA-12 identified for the record)

CO-HEARING OFFICER DODUC: Mr. Brodsky, you had asked me to stop you at 4:00 o'clock. I'm assuming you don't want me to stop you?

MR. BRODSKY: No, but I'm going to finish before my time is up.

CO-HEARING OFFICER DODUC: Okay.

MR. BRODSKY: Thank you, ma'am.

Okay. This is an aerial photograph of Discovery Bay. I guess my labels at the bottom don't quite show up.

WITNESS NADER-TEHRANI: Is this looking south?

MR. BRODSKY: You are looking south. And so you have Indian Slough there. And then you have Kellogg Creek. And then EC -- that ECD station we just looked at is a little bit out of view in the picture there where the red arrow is pointing. Does that give you sufficient orientation?

WITNESS NADER-TEHRANI: Yeah, yes.

MR. BRODSKY: Okay. Do you know in the modeling that you did for the BA if you have model output that shows in Indian Slough or Kellogg Creek at Discovery Bay the effects of CWF on temperature at those locations?

WITNESS NADER-TEHRANI: I did not do the modeling for the BA.

MR. BRODSKY: Does anybody know? Who knows the answer to that?

WITNESS NADER-TEHRANI: You're asking about water temperature.

MR. BRODSKY: Yep.

WITNESS NADER-TEHRANI: I know some water temperature analysis was done, but whether there was an actual station with output at the location you're just asking, I wouldn't know.

MR. BRODSKY: Does anybody know?

WITNESS WHITE: I don't know.

MR. BRODSKY: Okay. Do you know if there was any modeling done to show the effect of CWF on hydraulic residence times as those locations we're showing there in Indian Slough and Kellogg Creek?

WITNESS BRYAN: Yeah, I believe that as part of the BA, there was modeling done with DSM2 using the particle tracking model to look at residence times at a number of locations throughout the Delta.

And from my look at that, they -- there was -- they would often talk about regions. They might have done some compilation of individual stations. I'm not sure. I wasn't involved with that work.

But just looking at it, they had a number of locations across the Delta that they looked at residence time.

MR. BRODSKY: And do you know if any of those locations are within this photograph here?

WITNESS BRYAN: I don't know definitively if they're within your photograph. I do remember seeing something labeled "Discovery Bay." Again, I don't know if it was a Discovery Bay area or if it was a specific site within Discovery Bay, but there was something very near or in your figure that was modeled.

MR. BRODSKY: Where would I find that?

WITNESS BRYAN: That would be part of the

biological assessment.

MR. BRODSKY: Okay. And do you know if there was any modeling done as part of the biological assessment to show the effects of CWF on turbidity at those locations in Kellogg Creek and Indian Slough that are shown, turbidity -- and let me just ask, turbidity or dissolved oxygen?

WITNESS BRYAN: I personally don't have any knowledge of that one way or the other.

MR. BRODSKY: Does anybody on the Panel?

(No response)

MR. BRODSKY: Okay. All the questions I just asked about temperature, hydraulic residence time, turbidity and dissolved oxygen, do we have model output for what the effect of CWF would be inside the base of Discovery Bay?

I've pointed to the slough, Indian Slough and Kellogg Creek, that feed Discovery Bay. And we've got a number of bays in there, inside Discovery Bay. Do we have any model output for those parameters inside the bays?

WITNESS BUCHHOLZ: These parameters are basically with our fisheries analysis, which this panel isn't -- this panel is not able to answer these fisheries questions.

MR. BRODSKY: Well, those parameters have an impact on legal users and human uses as well. So you don't have any witnesses that can answer those questions?

WITNESS BUCHHOLZ: Not here today.

MR. BRODSKY: Okay. Isn't it true that shifting diversions to the North Delta diversions during July, August, and through September will cause increased water temperature inside the bays of Discovery Bay?

WITNESS NADER-TEHRANI: I have worked with water temperature models. And based on what I know, I don't have a reason to believe that California WaterFix will affect water temperature, but that's just based on my opinion working with water temperature models. But I don't have a proof to show.

MR. BRODSKY: Okay. All right. Isn't it true that California WaterFix will decrease dissolved oxygen inside the bays of Discovery Bay?

WITNESS NADER-TEHRANI: Once again, I don't have any evidence that would lead me to make a conclusion that California WaterFix operations will affect the dissolved oxygen in Discovery Bay.

MR. BRODSKY: And isn't it true that operation of California WaterFix will increase the hydraulic

residence time inside the bays of Discovery Bay?

WITNESS NADER-TEHRANI: I don't have an answer for that, so.

MR. BRODSKY: How about causing changes in turbidity inside the bays of Discovery Bay?

WITNESS NADER-TEHRANI: I think we said we don't have an answer for that.

MR. BRODSKY: All right. Let's move on to the next subject.

You used monthly mean average EC and chloride to demonstrate the effect of CWF on salinity; is that correct? Whoever's most appropriate to answer that...

WITNESS NADER-TEHRANI: That would be me. That was one of the forms of information I presented, yes.

MR. BRODSKY: Okay. Could we take a look at DWR-5, Page 54.

And that's the monthly average EC at selected Delta locations. That's a monthly mean average; is that right?

WITNESS NADER-TEHRANI: Monthly average. It's the same as monthly mean average, yes.

MR. BRODSKY: Okay. So my understanding of the way it's done, and please correct me if I'm wrong, is that you find the average for the month by taking,

let's say, the month of August, taking the EC level for all the days and then averaging that so you get an average for month. And then you take that month for all the years that are in the range. This was 16 years or 84 years?

WITNESS NADER-TEHRANI: 16 years.

MR. BRODSKY: 16 years. So you would take the month of August for each of the 16 years and average the daily EC into a monthly average, and then you would take each of those 16 Augusts and you would average those together. And then that would give you one figure, which would be the EC figure, which would be the monthly mean average; is that correct?

WITNESS NADER-TEHRANI: That's how I showed those results, yes

MR. BRODSKY: All right. And doesn't that mask -- doesn't that just even everything out and mask the fact that there are a lot of changes in EC from day to day or in one month in one year and not in another month in another year?

WITNESS NADER-TEHRANI: Like I said, that is one piece of information that I showed. Once we get to the compliance, the D1641 water quality objective, then it looks at the entire 16 years depending on the specific location we are looking at. For example, with

respect to Emmaton, we are looking at -- and there's no grouping there, so the information that's actually showed is based on the information for the entire period, whether the D1641 water quality objective applies. There's no averaging done there.

MR. BRODSKY: Okay. Can we take a look at SCDA-18 -- well, let's back up and let's take a look at DWR-5, Page 59.

So let's take a look at, for instance, this is a graph of water quality Old River at Tracy. It's showing EC for the no action alternative, Boundary 1, H3, H4 and Boundary 2.

And if we can take a look at the month of August there, there's very little difference between all the different alternatives; isn't that correct?

WITNESS NADER-TEHRANI: That's what I see, yes.

MR. BRODSKY: Maybe 40 or -- 40 microsiemens, something like that, just gauging by eyeball?

WITNESS NADER-TEHRANI: Are you asking about the difference?

MR. BRODSKY: Yes.

WITNESS NADER-TEHRANI: Between which alternative?

MR. BRODSKY: Between any of them. In other

words, the range there between no action alternative and --

WITNESS NADER-TEHRANI: Yes, that's about right for the month of August, yes.

MR. BRODSKY: And that's out of about 550, so it's a very small percentage difference between any of them?

WITNESS NADER-TEHRANI: Right.

MR. BRODSKY: Okay. So then let's take a look -- and that's based on a monthly mean average?

WITNESS NADER-TEHRANI: That's correct.

MR. BRODSKY: Okay. Then let's take a look at SCDA-18.

(Save the California Delta Alliance SCDA-18 identified for the record)

MR. BRODSKY: I'm presenting this just as a conceptual example and not asking you to comment on whether the absolute values on this chart are accurate or not. The zero line there represents the no action alternative. The spikes that go up show increases in EC. The spikes that go down show decreases in EC.

And so, for example, we have a blue spike going up in 1981, increasing EC, over the no action alternative by about 800 microsiemens. Do you see that on the chart?

WITNESS NADER-TEHRANI: Can you explain whether these are instantaneous values, daily average, or what?

MR. BRODSKY: They're daily values.

WITNESS NADER-TEHRANI: Daily average?

MR. BRODSKY: Yes.

WITNESS NADER-TEHRANI: Okay.

MR. BRODSKY: And then we see over in 1986, there's another blue spike going up that's increasing EC, looks like about 750 or 800 microsiemens over the no action alternative?

WITNESS NADER-TEHRANI: I see that.

MR. BRODSKY: And then we've also got throughout that time period, which is October '75 to October '91, quite a few years, we've got quite a few blue spikes that also go down and decrease EC. So for example, in 1989 there's a blue spike going down, and EC is decreased, looks like, by about 700 microsiemens?

WITNESS NADER-TEHRANI: Sorry. Can you repeat what period you're looking at?

MR. BRODSKY: I'm looking at 1989.

WITNESS NADIR-TEHRANI: Yes. And what about it? Can you say that again?

MR. BRODSKY: I'm sorry?

WITNESS NADER-TEHRANI: Can you repeat your

observation based on '89?

MR. BRODSKY: Looks like that's decreasing by about a little over 500 microsiemens?

WITNESS NADER-TEHRANI: Is that based on Boundary 1 or 2?

MR. BRODSKY: That's based on Boundary 1, the blue spike. The blue represents Boundary 1 and the brown represents Boundary 2.

WITNESS NADER-TEHRANI: Okay.

MR. BRODSKY: So if I were to represent to you that that blue spike going up in 1986, that that would make the EC level problematic for a farmer trying to withdraw irrigation water during that period -- let me represent to you that that's the case -- and that a number of those blue spikes going up would make it problematic for a farmer trying to withdraw irrigation water, if we represented this same data as a monthly mean average, those blue spikes would go away, and we wouldn't see them, would we?

WITNESS NADER-TEHRANI: When you do monthly average, you see less fluctuations, if that's what you're asking.

MR. BRODSKY: It would be unlikely that we would see those days -- that we would see that effect on the farmer where he couldn't irrigate his crops?

MR. BERLINER: Objection, assumes facts not in evidence.

WITNESS NADER-TEHRANI: I cannot answer that question.

MR. BRODSKY: Okay. Very good.

CO-HEARING OFFICER DODUC: We've made the point that averages do not affect fluctuations.

MR. BRODSKY: Right. We're moving on. Okay. Does anybody on the panel in any of the modeling that you did, did you do any modeling to explore how CWF could be used to -- as an improvement over the existing system to reduce reliance on the Delta as a source of exported water?

(No response)

CO-HEARING OFFICER DODUC: Is that a no?

(No response)

WITNESS BUCHHOLZ: When we developed the range of alternatives in the EIR/EIS, that was certainly a consideration, that our range would be consistent with the -- we compared that range with the requirements in the Delta Reform Act, which another portion of the Delta Reform Act actually has a provision for reduced reliance in the future on the Delta.

MR. BRODSKY: So in the current output for what's before the Board, the Boundary 1/Boundary 2

analysis, do we have model output that shows us how CWF is going to help us reduce reliance on the Delta that's currently before the Board?

WITNESS BUCHHOLZ: And the range of alternatives currently before the Board has a wide range of times in which we are reducing reliances on the Delta in the drier periods, and in a moving that -- those diversions towards the wetter periods in -- and that is -- so we've look at it more on a time and seasonal basis.

MR. BRODSKY: Does -- do you show, does your modeling show that, for each contractor that receives water, that contractor's deliveries of water can be reduced either in absolute terms or as a percentage of that contractor's portfolio?

WITNESS BUCHHOLZ: That wasn't a specific criteria. And we don't, in any of the documents, look at delivery specifically to individual contractors or water users.

MR. BRODSKY: Do you look at all the water contractors together, that it reduces their use of Delta water either in absolute terms or as an aggregate in their total portfolio in percentage terms?

WITNESS BUCHHOLZ: It depends on the alternative. We have alternatives in the range that do

reduce total exports to different portions of the State Water Project and CVP water users, and others we don't. That's why we do a range of alternatives is the to provide that to the decision makers.

MR. BRODSKY: And those would be the ones closer to Boundary 2, correct?

WITNESS BUCHHOLZ: Boundary 2 reduces exports as compared to Boundary 1, yes.

MR. BRODSKY: Okay. Thank you very much. I'm done.

CO-HEARING OFFICER DODUC: Thank you, Mr. Brodsky.

Let me ask the witnesses and the court reporter. Do you need a five-minute break?

Just -- okay. Let's take a five minute break. we will resume at 4:20.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It's 4:20. Back in session.

Ms. Des Jardins?

MS. DES JARDINS: Thank you.

CROSS-EXAMINATION BY MS. DES JARDINS (resumed)

MS. DES JARDINS: My name is Deirdre DesJardins again. And I wanted to go to Exhibit DWR-71, Page 12 to 13 and Line 27 to 28, down towards

the bottom. Go down a little further. I think it might be on the next page here. Okay.

Sorry. It reads, "Because it is a simulation," yada, yada, "CalSim II cannot be calibrated."

I wanted to look at something specific about the model to address that assertion. And I was hoping you could go to "Additional Exhibits" folder that I provided. Let's go into the Cross Channel Gates, "XCgates," yeah, the 122. Oh, wait. That needs to be open in Notepad. Just right click and open it with Notepad.

Yep. You're going to have to zoom. It's not zooming.

MR. LONG: It does not zoom out.

MS. DES JARDINS: Go ahead and scroll down. So scroll down a little further. And scroll down a little further. Scroll down a little -- stop.

So it doesn't zoom. This just shows that the Delta Cross Channel flow is 18.9 percent -9/6th's percent of the Sacramento River flow.

CO-HEARING OFFICER DODUC: Ms. DesJardins, what is it that we are looking at?

MS. DES JARDINS: It's harder to tell because it's not there.

So this is -- scroll back up to the top.

This is actually the cross channel code, part of CalSim. And it was written by, first, Eric Reyes July 2nd, 1998, by Armin Munevar on November 20th, 1999.

Do you recall working on this module, on this component of the code?

WITNESS REYES: Yes, I do.

MS. DES JARDINS: Okay. So basically, this represents the diversion of water through -- through Delta Cross Channel on Georgiana Slough, correct?

WITNESS MUNEVAR: That's correct.

MS. DES JARDINS: Okay. So let's scroll down a little bit further. Oops. Up. There we go.

And so you use these equations. This is the current assumption. And so these are flows in cfs. And "QSac," it's an abbreviation, and it means that's the current flow in the Sacramento River, correct?

WITNESS MUNEVAR: No, that's not correct. This is -- you're looking at Russell code, which is the model code for the CalSim model. And we have our own definition of what QSac is here, and I think it's defined above. It's just a flow -- especially from a CalSim perspective, it's the flow above where the cross channel gate is.

MS. DES JARDINS: So it's the flow in the Sacramento River above the cross channel gate?

WITNESS REYES: Yes, that's correct in CalSim.

MS. DES JARDINS: So this is looking at the percent that's diverted through the Georgiana Slough and the Delta Cross Channel. Then they're given by these two equations.

WITNESS REYES: Is that -- I didn't hear a question.

MS. DES JARDINS: So is it correct that these are -- it's given by these two equations that you documented in the code?

WITNESS MUNEVAR: I mean, roughly. I can't see all the comments, but --

MS. DES JARDINS: All the code. Yes. Okay. So I have to do that.

But assuming this, this gives a certain percentage of the flow that's diverted through the Delta Cross Channel. And that is dependant on the flow above the Delta Cross Channel.

And this is something that you're assuming is constant, doesn't depend on the level of development, doesn't depend on climate change; is that correct?

WITNESS REYES: I know I -- I mean, you just saw my name up top, and it had some date associated

with it. So when I originally developed this or worked on this, it was based on a regression of observed data.

MS. DES JARDINS: There is it is. That's better. Thank you.

WITNESS REYES: And then I believe when there was some climate change type of scenarios that were developed, we developed new regressions based on DSM2 data.

MS. DES JARDINS: Yeah. So that's documented in the code up at the top. You do have the flow through the Delta Cross Channel. You have the old equations which are there. And it says, "The Delta Cross Channel diverts about 16 percent of the flow above the Cross Channel above 1261 cfs." That was the old one.

And then down on the new one, you say, "The Delta Cross Channel diverts 18.96, almost 19 percent of the Sac- -- just of the flow in the Sacramento River. So that's the new equation. And it's implemented in the code below. Is that -- your recollection?

WITNESS REYES: Yes, and I think also another possible change to that equation or what's being accounted for is -- and people from DSM2 can help me out here -- but Liberty Island correction. So in other words, observed data that developed that original

equation had a different Delta configuration than what is even present today. And DSM2 was updated to reflect that change.

CO-HEARING OFFICER DODUC: Thank you, Mr. Reyes. Now, Ms. DesJardins --

MS. DES JARDINS: Okay. I --

CO-HEARING OFFICER DODUC: Let me just -- as and engineer and a former modeler, I could spend months playing this with you and Mr. Reyes. But, again, I've asked you to limit your cross-examination to the extent that you want to explore the reliability of the model as used by these witnesses in support of this petition for the comparative analysis that they've submitted; I would grant that.

So help me understand why we are digging into the code and how that -- how this code and the way that the program is coded, how would that differ? Why does that --

MS. DES JARDINS: Let me just say --

CO-HEARING OFFICER DODUC: Ms. DesJardins, for a comparative analysis that was submitted to us, why are we doing this?

MS. DES JARDINS: So the thing is that, between the two scenarios, I believe -- with project and without project -- they both essentially assume the

Delta Cross Channel diverts 19 percent of the flow in the Sacramento River.

This is an example. This is where -- and one could test. If that's reasonably accurate, then it's fine. If not, and if the Delta Cross Channel diverts 33 percent of the flow in the Sacramento River, as I found in looking at gauge data in critically dry years, then this might substantially underestimate the total flow diverted by both.

CO-HEARING OFFICER DODUC: And these witnesses have repeated many, many times, that comparing the model and the output model with historical data and using the model in the model result for predictive purposes is not what they are proposing.

In fact, they do not want the model to be used that way. They are using it for comparing of purposes.

So to the extent -- to the extent that, if they are underestimating or overestimating certain components -- I'm not saying that they are -- that effect would be shown in both model runs and therefore that's why they're looking at the differences; that's why they are doing a comparative analysis of the two model runs rather than what you are suggesting.

MS. DES JARDINS: Ms. Doduc, I just wanted to get -- I'm not looking at that. And you're jumping

ahead. I just wanted to look at the assertion that this code could not be calibrated. That is all I'm looking at.

I understand it's late and you're tired.

CO-HEARING OFFICER DODUC: Ms. Des Jardins --

MS. DES JARDINS: I believe this can be tested and compared with actual flow information.

Is that not true?

CO-HEARING OFFICER DODUC: So let me ask Mr. Reyes.

In -- well, Mr. Munevar, for that matter. In the various calibrations of CalSim, to what extent -- or did you go into this level of detail in terms of the calibration of the model?

WITNESS MUNEVAR: For this specific aspect here, there was a substantial amount of work looking at the DSM2 model and historic data and how the flow splits occur.

And, again, we are using this in a monthly basis to characterize the flows, but for this particular aspect, we've relied upon the much more detailed DSM2 model to provide those flow splits that occur at the Cross Channel and Georgiana Slough.

MS. DES JARDINS: Again, I wanted to say, isn't this something that you can compare with the

actual flow data? You have flow -- this is not time dependant; this is not dependant on development. It's just how much flow is above the Delta Cross Channel and how much flow is going -- what percentage of that flow is going through the cross channel.

This is a physical -- this is a modeling assumption, and isn't this something that can be tested and compared with actual data?

WITNESS MUNEVAR: So just -- this is not a modeling assumption. This is a model regression that has been derived upon by historic and DSM2-simulated flows. So this is our best estimate of how it applies on a monthly level. It's not an assumption that would need to be tested. It is our best estimate based on a daily analysis.

MS. DES JARDINS: Where is that analysis available?

MR. MIZELL: At this point, I'm going to object to the relevance of digging into specifically just the cross channel gates since modification of the cross channel gates is not part of the California WaterFix.

CO-HEARING OFFICER DODUC: Ms. Des Jardins?

MS. DES JARDINS: Respectfully, this goes to the fundamental issue of whether the model can be

calibrated and whether the errors in the model can be documented. And, respectfully, that goes to the issue -- this is just one small component, yes, but it's something that's easily looked at.

And that goes into whether we can examine or rebut the assertions that this has been adequately calibrated because we've -- PCFFA subpoenaed the calibration for this. And DWR refused to provide it.

CO-HEARING OFFICER DODUC: Mr. Mizell?

MR. MIZELL: Let the record reflect that I am not aware of any subpoena beginning giving for the data that she's referring to. I believe we've responded appropriately to all requests for data up to this point.

CO-HEARING OFFICER DODUC: All right. Thank you.

MS. DES JARDINS: I would say there was a large set of objections, and almost none of it -- pretty much none of the calibration data was disclosed.

And the issue I have here is that what the peer review panel said is that, for this model to be used in relative mode, it's something that would have to be documented rather than merely assumed.

And I would assert that simply providing your calibration information for things like this would

document it. But I cannot find that calibration data anywhere on the Web. And I have not been able to get it on request. And, respectfully, you didn't disclose a great deal.

I also requested the calibration data for the Sacramento Valley module for the relevant thing, and it was because of that error in the Colusa Basin drain. So where is that data published?

Is this really a public model? Are you publishing your calibration data anywhere?

MR. BERLINER: Objection, argumentative.

CO-HEARING OFFICER DODUC: Just answer to the best that you can.

WITNESS MUNEVAR: Yeah. I think, as we have stated before, CalSim is not calibrated, per se. And in a -- just a kind of classical sense I think, as you're pointing out here, these are the regressions that are included in the model, and it's documented here.

MS. DES JARDINS: But this refers to the flow results from a 2009 DSM2 recalibration model. You say you've looked at it closely. But I can't examine that. As a physicist, I work with this all the time. I would just like to look at your calibration data and verify that this actually represents it.

And I can't do that if you won't disclose your data.

WITNESS MUNEVAR: The calibration is documented in the Draft EIR/EIS. I believe DWR makes their DSM2 model ready available as well as their -- I don't speak for DWR. Tara, maybe you want to talk about where in the DSM2 updates are always posted.

CO-HEARING OFFICER DODUC: Ms. Des Jardins, I think your concerns with respect to the calibration with respect to the model, you've made very clear for the record, both in your written materials as well as in your questioning of these witnesses.

I don't think they're going to magically whip out anything today as a result of your questioning. So I would encourage you to move on.

MS. DES JARDINS: Okay. Thank you.

Just a second. Let's go back to -- I would like to -- let's close this, please. And close this.

Let's go to "Munevar Highlighted." And I did want to go to -- I'm sorry. My notes, I'm having a problem with -- let's go ahead and close this, and I'll ask a question just a second. So we can -- we can close this. Go to DesJardins. Go back. And let's go to back to "Modeler Questions." And let's go to "Climate Change."

And Mr. Munevar, I did want to ask you about the assertion that you felt that only looking at one climate change scenario was sufficient. Are you -- and I wanted to bring up No. 60, no -- oh, yeah. That's it. Okay.

And so this is a presentation you gave on climate scenarios in 2011. And I'm just bringing it up because it has information on it. So, let's scroll down to page -- just a minute let me grab my power supply.

Please scroll down to the next page. Keep going. Keep going. Keep going. Keep going. Keep going. Keep going. Keep going. Okay.

So you used this set of 112 climate projections. This is the ensemble method. And it's CMIP3; is that correct Mr. Munevar?

WITNESS MUNEVAR: It is. I think the details are documented in the EIR/EIS.

MS. DES JARDINS: Okay. And so I wanted to go into -- you refer to Gleckler et al., 2008, that "Multi-model Ensemble Is Superior To Any Individual Model Projection."

Can we put this away, please? And I want to bring up 62. This is the reference document, "Evaluation of Climate Models," and I have the

appropriate section excerpted.

Can we close this?

And then No. 63, this is just -- I wanted to say, yet, you reference this document, but did you look closely at -- "WNA" is Western North America. The blue line is CMIP3, and the red line is CMIP5.

And the actual data -- the actually -- this really doesn't match historical precipitation much at all.

MR. BERLINER: Objection. The questioner's testifying here. If there's a question, she should ask it.

MS. DES JARDINS: I would say did you ever look at this graph? You obviously referenced it. Did you ever look at this graph, and did you ever consider the fact that the -- did you ever consider the fact that's shown here?

WITNESS MUNEVAR: I don't know what fact is shown here. I considered this document in its evaluation of whether -- how might you combine models and which is a preference for combining models. And that was the statement that was on the slide where the multi-model ensemble is the preferential or preferred approach.

MS. DES JARDINS: So you never looked at the

error rate of the ensemble --

Let's scroll down a little more on this.

You never looked at the error rate -- you can run these models in an unforced thing, and you never looked at the error rate of the ensemble over western North America?

MR. MIZELL: Objection, misstates the witness's testimony.

MS. DES JARDINS: Did you ever look at the error rate over western North America of the ensemble of climate models?

WITNESS MUNEVAR: So we did not use this data. We used down-scaled data that was associated with -- specific for California and the Central Valley.

MS. DES JARDINS: Respectfully, your slide says you used CMIP3. And that's the global climate model that forces it. Yes, you do have a method of down-scaling. Did your method for down-scaling correct for this kind of bias?

WITNESS MUNEVAR: It's not our method for down-scaling. It's a method that's conducted by Reclamation, Lawrence Livermore, and other researchers that have developed a regional down-scaled data set that corrects for both biases in the climate models as well as spacially down-scales them. Those data sources

are identified, and that was the primary data source that we utilized for our assessing.

MS. DES JARDINS: So you used their bias correction, bias corrected data set?

WITNESS MUNEVAR: That's correct.

MS. DES JARDINS: Okay. Thank you. Let's put this away.

I would like to go back to Munevar, No. 60. Go ahead, scroll down. Keep scrolling. Keep scrolling. Go back up one.

So originally you had these drier scenarios. Over on the left, there's Q2 and Q1 as well as the central tendency. This shows the precipitation change and whether there's more -- which can be -- models can be either wetter or drier. You partitioned on there whether they're wetter or drier and whether there was more warming in the model or less warming in this set of 112 models.

And you have these input data sets for the drier hydrology. And I was wondering why they aren't -- there is none of that information provided -- they were used -- that was provided. That kind of climate change sensitivity analysis was provided for the biological assessment, but you're not providing it for the WaterFix. And I'm wondering why.

WITNESS MUNEVAR: For the WaterFix and the Draft EIR/EIS, there is a sensitivity analysis that compares all of these. What's called the Q1, Q2, Q3, and Q4 climate centers are all compared against the no action without climate change and for the proposed project, which I believe at the time was, I believe, Alternative 1, with all five of those climate change scenarios.

MS. DES JARDINS: Where is this again?

WITNESS BUCHHOLZ: It's in Appendix 5A, Sections D2 and D3 of the Draft EIR/EIS.

MS. DES JARDINS: Thank you. I do want to scroll down. Continue scrolling down, please, on this slide.

And keep going. Keep going. Keep going. Stop. Go back up one, yeah.

So the issue here, this is the change in annual runoff in rivers. I believe, Mr. Munevar, this is the Trinity, here, Shasta, Cottonwood, Oroville. This is inflow to the various reservoirs.

And what we see is, under Q1 and Q2, the drier climate change scenarios, there can be a significant reduction even by 2025; is that not correct?

WITNESS MUNEVAR: That is correct. Those are the scenarios that are warmer than median of the

consensus models and that are drier.

MS. DES JARDINS: And so this -- there's information available on the biological assessment data set for all of the CalSim variables, including reservoir storage, flows, exports, total deliveries to various contractors.

But because that's not provided here, there's -- there's none of that information is available. And I guess I wanted to ask you, so that the green dots up there, that are -- the Q5 scenario, they show for most of those -- most of those streams, most of those inflows, they show almost no change until you get down to around New Hogan and New Melones; is that not correct?

WITNESS MUNEVAR: That's right. Under these projections, the median of the projections actually suggest a slightly wetter Sacramento and a drier southern San Joaquin and Tulare Lake Basin.

MS. DES JARDINS: So this is essentially projecting that, at least as far out as 2025 in near term, that the main inflow in the Sac River is going to be unchanged to slightly wetter; is that not correct? I mean, that seems to be kind of what this graph is showing is that that's kind of -- that that's what comes out of your selecting that scenario, the Q5

central tendency scenario.

WITNESS MUNEVAR: So I'll assume that this slide matches what's in our appendix, since we don't have that, which should have similar information.

But the main aspect of climate change, particularly in the near term in the Sacramento Valley, is due to warming aspect and its seasonal influences on stream flow and snow pack development.

So even with the scenario where you may have no net change in Sacramento River runoff on an annual basis, we have substantial changes on a seasonal basis. In virtually every one of ours, we have January, February, March flows increasing. I believe January, February for sure. April, May, June, and July summers are decreasing.

And that seasonal offset and the timing of flows is what's the largest driver to water operations in the Sacramento Valley.

MS. DES JARDINS: So this -- respectfully, this does show -- so I understand that the central tendency scenario shows -- it shows significant -- shows only seasonal shifts. But this shows that the drier warmer scenarios show not only seasonal shifts but a really significant reduction in runoff; isn't that true?

WITNESS MUNEVAR: If you were to select only that subset, it would be a drier -- a drier future both in the no action and in the WaterFix that's correct.

MS. DES JARDINS: And these scenarios show -- the drier scenarios show the biggest risk in terms of loss of deliveries, loss of water to meet upstream needs, in-basin needs; is that not correct?

MR. MIZELL: At this point, I'm going to object. We have exploring the choice of the Q5 climate change scenario for quite some time now. And I've sort of let the questioner run with it, hoping that we would get to some point where we would have some relevance as to why the choice we made was misused.

But I believe right now, all I've heard is that Ms. DesJardins just doesn't agree with our choice. And she's happy to make that case in her case in chief. I'm not sure if cross-examination is the right place for it though.

CO-HEARING OFFICER DODUC: Ms. Morris, did you have something to add?

MS. MORRIS: No.

CO-HEARING OFFICER DODUC: Ms. Des Jardins, did you have a specific question?

MS. DES JARDINS: The other thing I wanted to know, because the Board -- I requested and the Board

mandated that -- I requested information on early sensitivity analyses and what internal information you might have that was in addition to that published in the EIR/EIS, which is fairly sketchy.

And they mandated that you provide that and all of the associated data. And the response was that for some reason you couldn't provide it. Is there some reason that you can't provide these sensitivity analyses, not just climate change but other kinds of sensitivity analyses and the underlying data?

CO-HEARING OFFICER DODUC: Mr. Mizell?

MR. MIZELL: Well, I'm going to take issue with the facts as they're presented by the questioner. We've responded to numerous requests for information from Ms. DesJardins. And as far as I'm aware, we've done so in a very open manner. And she has all the information as well as the explanations as to why there might be a lack of what she believes to be information.

We've done that extensively and over a great number of contacts with her. So the assertion that we have somehow disobeyed subpoenas or requests by this Board that we engage and provide full information to her I think is misplaced.

MS. DES JARDINS: I think that's something that would have to be addressed on brief. I'm not

going to argue it during cross-examination.

CO-HEARING OFFICER DODUC: All right.

MS. DES JARDINS: But there is no reason that you cannot provide it?

CO-HEARING OFFICER DODUC: Ms. DesJardins.

MS. DES JARDINS: Yeah.

CO-HEARING OFFICER DODUC: We directed DWR to respond, not necessarily to give you whatever you want. So your issues with them aside, what I need -- my responsibility as Hearing Officer is to ensure that the hearing conducts -- goes in a productive manner.

I guess I take a little bit of exception to your earlier comment, that we're rushing through this because we're tired, it's the end of the day. It is the end of the day, and we are tired.

But to the extent your cross-examination is productive and actually leads to information that will be of value to the record, and of value to the Board as we consider this petition, then I will allow you to proceed. It's not a question of the timing or the time you have. It's a question of the quality of the time that you use. And so far, I have to say that the quality is not there.

So I will allow you to continue, but again, I ask you to keep in mind that the purpose of

cross-examination is to add value to the record.

MS. DES JARDINS: And I apologize. I've been trying to bring my notes up on my laptop, and I had very extensive notes.

So can we -- let's close this and go back up to modeling questions. And let's -- and let's go into CalSim. The one thing -- can we go to No. 54, please. Let's scroll down. So the one thing I wanted to do -- so, the peer review panel took issue with the validation that you presented.

And I respect Ms. Doduc in not wanting to go back, but I'd like to go -- let's please scroll down, continue controlling down on this.

This is from your 2004 peer review response.

Just go up.

So Page -- this is Page 18 and 19 of your response -- 2004 response to the peer review.

And I wanted to re- -- let's go down to highlighted part on Page 19. "DWR and Reclamation believe that model calibration to determine the value of physical parameters is a valuable exercise and benefits model accuracy and reliability. However, DWR and Reclamation suggest that a more reasonable approach to defining behavioral parameters is a" -- I believe that should be "thorough discussion with system

operators to define current operational policy or rules."

And then I'll skip over. It says, "It would appear more reasonable to define operating rules in conversations with operators and subsequently use a recent wet, normal, and dry year in the validation exercise."

And, Mr. Reyes, do you recall anything about this? About using a recent wet, normal, and dry year in a validation exercise for CalSim?

WITNESS REYES: At the time that this was done in 2003, there is a validation, historical validation study that was done kind of concurrent with the peer review.

MS. DES JARDINS: Okay. So let's scroll down a little bit more.

So the following points explain what calibration has been undertaken for the Sacramento Valley.

You go into that in some detail. Let's go down a little bit further. Keep scrolling.

"DWR and Reclamation recommend the following approach to CalSim II calibration and validation. Modeling staff continue to work with project operators to define operating rules that correctly capture

current policies. Following recalibration of CVGSM, your groundwater model" --

(Reporter interruption)

MS. DES JARDINS: -- "CVGSM, the model is refined and recalibrated. Develop methods to validate assumptions regarding land use, change impacts on rainfall runoff.

So, Mr. Reyes, have you been -- you've been undertaking to do these steps since 2003?

WITNESS REYES: Yes, my group has -- has -- I mean, it's a, I guess, a standing policy of our group, which is in charge of the CalSim model, to constantly try to improve the model through calibration of the CVGSM model, now called C2V Sim. We interface with the operators, like was said earlier, and try to define our operating rules as best we can in a monthly model. And we try to validate land use and their impacts on runoff also.

MS. DES JARDINS: Let's scroll down to Page 20. "After completion of the above, CalSim II should undergo a limited validation exercise using different recent year types."

I wanted to ask, have you ever done that limited validation exercise?

WITNESS REYES: As I stated earlier that was

done back in 2003.

CO-HEARING OFFICER DODUC: Ms. Morris?

MS. MORRIS: I'm going to object again to this whole line of questioning as it goes to the model itself and not as to the modeling that's been presented to the Board for this project.

CO-HEARING OFFICER DODUC: That is a very valid objection.

Ms. DesJardins?

MS. DES JARDINS: I want to say just that the -- whether the base model -- there is obviously controversy, and it goes back to the very beginning of CalSim II, about whether the model can be used in the mode it is.

And this was not 2003. This was written in 2004. Have you ever done a limited validation exercise using year types from, like, post biological opinion? So, like, you know, you would have to construct an input data set for those years. And you could run it for 2010, 2011, you know. Have you ever done that? Have you ever considered doing that?

MR. MIZELL: Objection to the complex question.

MS. DES JARDINS: I'm sorry. Let me break it down. So --

CO-HEARING OFFICER DODUC: Ms. Des Jardins --

MS. DES JARDINS: Yeah?

CO-HEARING OFFICER DODUC: Mr. Reyes.

MS. DES JARDINS: Yeah.

CO-HEARING OFFICER DODUC: You have testified that CalSim has undergone recalibration and validation. Was it done using different recent year types?

WITNESS REYES: To clarify, it underwent a quasi validation but not a calibration. And we haven't used recent hydrology to do that.

CO-HEARING OFFICER DODUC: Okay.

MS. DES JARDINS: Have you ever done -- so you've modified the model extensively since what you presented in that 2003 study. Have you ever done this limited validation exercise since then?

WITNESS REYES: That validation exercise was to verify if we could -- if the CalSim model does an accurate job of water allocation and water accounting. And essentially that validation verified that it did that. And since that time, we've -- through our community modeling efforts, have tried to access various staff from operations, modelers from the fish agencies, and tried to improve our model to better represent the Sacramento Valley and the San Joaquin Valley and the Delta.

And so we haven't gone back and revalidated because we've only been trying to improve the model.

CO-HEARING OFFICER DODUC: Ms. DesJardin --

MS. DES JARDINS: I just have one follow-up question on this, and then I'll be done. But I would like to go back to what -- the 2003 period, you said about the historic validation.

CO-HEARING OFFICER DODUC: Is this the last question of your cross-examination?

MS. DES JARDINS: Yes, this is. Yes.

CO-HEARING OFFICER DODUC: And it is?

MS. DES JARDINS: Yeah.

Can you close this. And then let's go to "DesJardin," and then go to "Additional Exhibits." And yeah, 121, thank you.

And this is what it states. "There are a number of elements in the CalSim II validation report which reduced confidence, including State Water Project demand south of the Delta, were set at historical deliveries with no restriction and at the contractors' request level in restricted years."

And then it says, "The validation run does not provide reliable information on how well the model can represent these demands."

Let's scroll down a little more.

"The report estimates" -- "provides estimates of State Water Project and Central Valley Project deliveries south of the Delta, but then adjusts them for changes in storage before presenting comparisons of those results. This process merely checks that the model is preserving the water balance and does not present a legitimate validation of model deliveries. The report provides statistics on long-term" --

CO-HEARING OFFICER DODUC: And your question is?

MS. DES JARDINS: Is, so, can you address -- can you address -- you had promised in 2004 to do another validation run, and it was addressing these concerns.

You know, and you're now saying that you don't believe your peer review panel that it needed to be run, redone?

CO-HEARING OFFICER DODUC: So for the record, this is an excerpt from?

MS. DES JARDINS: This is an excerpt from the 2003 peer review that you've -- that they refer to. This is the peer review, and the peer review did look at the historic validation study.

MR. BERLINER: I'm going object on the grounds that this is asked and answered. Mr. Reyes already

testified that they've updated the water delivery capabilities of the model. It's just rehashing the same question.

MS. DES JARDINS: But it's never been revalidated. And the peer review panel did recommend it.

I'm just saying, you know, why are you ignoring the recommendations? It's something that you committed to doing in response to this peer review.

CO-HEARING OFFICER DODUC: Mr. Reyes --

Let Mr. Reyes answer, for the record, please.

WITNESS REYES: Every two years, the Department produces the delivery reliability, or delivery capability report is what is called now. And that is an estimation of our ability to deliver water. And that is sort of our update or validation of recent deliveries.

MS. DES JARDINS: Mr. Reyes, I've looked at that report, and it says that your minimum delivery is 20 percent. But your minimum deliveries are zero percent.

CO-HEARING OFFICER DODUC: Mr. Mizell?

MR. MIZELL: Objection, no question pending, making testimony, argumentative.

MS. DES JARDINS: I would like that ask

Mr. Reyes -- let me rephrase that.

Haven't -- you know, haven't -- didn't you notice -- you had done this 82-year study, and it's like the minimum is 20 percent. Have you not considered doing this validation in light of that your deliveries in 2014 were zero.

MS. MORRIS: Objection, relevance, misstates -- assumes facts not evidence.

CO-HEARING OFFICER DODUC: Objection, noted.

And Mr. Reyes, do you have an opinion to offer on that question?

WITNESS REYES: Sure. As far as the DCR, I don't recall a 20 percent minimum. If anything, I believe it was 10 percent or 11 percent in the 2015 model.

And then also, a zero percent allocation, I don't know if that's true either. I'm just -- I'm not an operator, so I don't know that number.

CO-HEARING OFFICER DODUC: Okay. Thank you.

MS. DES JARDINS: Okay. So the other thing is that the delivery reliability report --

CO-HEARING OFFICER DODUC: Are you asking a question or are you testifying?

MS. DES JARDINS: I wanted to ask did your CalSim simulations that you've been doing for the

delivery reliability report, have they shown that you can meet D1641 in all years? Haven't they?

CO-HEARING OFFICER DODUC: Are you able to answer the question? If you do not know, you do not know?

WITNESS REYES: I believe they do meet D1641. Yeah.

MS. DES JARDINS: And so isn't what you're seeing now, isn't that substantially different than what the model predicts, at least the 82-year runs that you've been doing?

CO-HEARING OFFICER DODUC: Ms. Morris?

MS. MORRIS: Yeah, I don't know -- it's unclear. The question is ambiguous. And I think if there's a specific question, you need to identify what you're asking about. It's too broad.

MS. DES JARDINS: I'm sorry. So I wanted to refer to the temporary urgency change petition that you filed in 2014.

CO-HEARING OFFICER DODUC: Which is not reflected in the modeling.

MS. DES JARDINS: Yes.

So, and your modeling didn't show that you were going to need to do that. So I'm -- you know.

MR. MIZELL: I'm going to object. We've spent

some time in the operations panel with John Leahigh explaining how the models do not necessarily capture the outlier years, such as the extreme circumstances of the last four years of drought, five years of drought.

That testimony is on the record and Ms. Des Jardins had her opportunity and did ask questions about the TUCPs at that time.

MS. DES JARDINS: Respectfully, there's two components to this. One is they asked -- the modelers testified, the operators testified, and then there's how -- about how they run the project using spreadsheets. They do not use CalSim to run the project.

And the question is you say that you have been -- you have accurately captured how they run the project, but the model did not predict situations like the TUCP in 2014 and 2015.

CO-HEARING OFFICER DODUC: Let me just ask the panelists in general. Are any of you confident enough in your understanding of TUCPs and how the operation people use and determine the need for a TUCP to answer any questions regarding TUCPs?

I see shaking of heads. I will take that as no one here believes they have the expertise to answer questions specific to TUCP and how the Department or

the Bureau, for that matter, uses TUCPs, and TUCPs were not part of the modeling.

WITNESS MUNEVAR: That's correct.

MS. DES JARDINS: Yeah, I just -- is there anything in the modeling that you've done with the delivery reliability report that indicates that you would run out of water to meet D1641 requirements in any of the water years that are modeled?

CO-HEARING OFFICER DODUC: If you can answer that.

WITNESS REYES: I'd to have look at the specific numbers and see if we're going to dead storage or not and depending on what situation. I don't know offhand.

CO-HEARING OFFICER DODUC: Okay.

MS. DES JARDINS: Okay. Thank you. That concludes my questioning.

CO-HEARING OFFICER DODUC: Thank you.

And that concludes the cross-examination.

Mr. Mizell, do you have any redirect?

MR. MIZELL: No, we do not. Thank you.

CO-HEARING OFFICER DODUC: And in that case, I thank all the witnesses. This Panel is dismissed unless we call you back at the end of Part 1A for additional questions from the Board and the Board

Staff.

Per request from some of the parties, the hearing dates for next week are dismissed. We will see you again on September 22nd, and we will be in the Sierra Hearing Room on September 22nd.

Thank you everyone.

(Whereupon, the proceedings recessed at 5:14 p.m.)

STATE OF CALIFORNIA)
) ss.
COUNTY OF MARIN)

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 2nd day of September, 2016.

DEBORAH FUQUA

CSR NO. 12948