BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

| | |
|---|---|
| CALIFORNIA WATERFIX WATER RIGHT CHANGE PETITION HEARING | ) ) ) |

JOE SERNA, JR. BUILDING

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

COASTAL HEARING ROOM

1001 I STREET

SECOND FLOOR

SACRAMENTO CALIFORNIA

PART 2

Monday, March 26, 2018

9:30 A.M.

VOLUME 21

Pages 1 - 292

Reported By: Deborah Fuqua, CSR No. 12948

Computerized Transcription by ProCAT

APPEARANCES:

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present

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

Staff Present

Andrew Deeringer, Staff Attorney
Conny Mitterhofer, Senior Water Resources Control Engr.

PETITIONERS

For California Department of Water Resources
Tripp Mizell, Senior Attorney
Duane Morris, LLP
By: Jolie-Anne Ansley, Attorney at Law

State Water Contractors
Becky Sheehan

PROTESTANTS

Cities of Folsom and Roseville, San Juan Water District, Sacramento Suburban Water District, and Sacramento Valley Water Users Group
Ryan Bezerra

California Sportfishing Protection Alliance, California Water Impact Network, AquAlliance
Michael Jackson

(Continued)

APPEARANCES (continued):

Grassland Water District
Ellen Wehr

Delta Agencies and other parties
John Herrick

San Joaquin Tributaries Authority
Tim O'Laughlin
Tim Wasiewski

City of Antioch
Matthew Emrick

County of Sacramento
Bill Burke

City of Stockton
Paul Simmons

Contra Costa County, Contra Costa County Water Agency, and Solano County
Kurtis Keller

California Water Research
Deirdre Des Jardins

---o0o---

I N D E X



(continued)

INDEX (continued)



(continued)

INDEX (continued)



---o0o---

Monday, March 26, 2018 9:30 a.m.

PROCEEDINGS

---o0o---

CO-HEARING OFFICER DODUC: Good morning, everyone. Please take your seats. It is 9:30. Welcome back to this Water Right Change Petition Hearing for the California WaterFix project.

I am Tam Doduc. To my right is Board Chair and Co-Hearing Officer Felicia Marcus. To the Chair's right, Board Member DeeDee D'Amado. To my left, Andrew Deeringer and Conny Mitterhofer. Also assisting us today is Mr. Hunt.

I think I see some new faces, so just in case, since we did have an event last week, in the event of an emergency, please exit this door after the alarm sounds. We found out on Friday that apparently the petition falls closed, and people cannot exit from that door.

So in the event an alarm sounds, exit this door [indicating] and go down the stairs, and we will meet up in the park across the street. If you're not able to use the stairs, please flag down who I hope will be security people, safety monitors out in the hallways, and you will be directed to a protective area.

Secondly, please take a moment and put your -- I really have this on my brain. It must have been a noise annoyance on Friday because of the alarm.

Please take a moment and put your noise-making devices on silent, vibrate, or do not disturb.

And as always, this is being webcasted and recorded, so please speak into the microphone, and begin by identifying your name and stating your affiliation for the court reporter, who is back with us. If you would like to have a copy of the transcript sooner than at the end of Part 2, please make your arrangements directly with her.

A couple of quick housekeeping items -- a reminder today that we will take the late but longer lunch in order to adjourn to closed session on the WaterFix. So I'm estimating we will adjourn sometime close to the 1:00 o'clock time frame and then reconvene at 2:30.

Another reminder that the hearing for this Friday has been canceled along with some other cancellation dates that is in the schedule that staff sent out on Friday. So please check that. And on Thursday, we will try to wrap up around 4:00 o'clock.

And with that, are there any housekeeping matters?

(No response)

CO-HEARING OFFICER DODUC: All right. I think we finally now are able to turn to Dr. Petrie.

Thank you for joining us today. And if I could go ahead and ask you to stand and raise your right hand.

(Witness sworn)

DR. MARK PETRIE,

called as Panel 2 witness by the Protestant Group 44, Grassland Water District, having been first duly sworn, was examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you.

Ms. Wehr.

MS. WEHR: Thank you. Ellen Wehr for Group 44 Grassland Water District.

Dr. Petrie, welcome. Is Exhibit GWD-2 a true and correct copy of your statement of qualifications?

WITNESS PETRIE: It is.

MS. WEHR: And is the GWD-1 a true and correct copy of your testimony?

WITNESS PETRIE: It is.

MS. WEHR: Is Exhibit GWD-4 a true and correct copy of the Central Valley Joint Venture 2006

Implementation Plan?

WITNESS PETRIE: It is.

MS. WEHR: Is Exhibit GWD-5 a true and correct copy of the location map of CVPIA South of Delta Wildlife Refuges?

WITNESS PETRIE: Yes, it is.

MS. WEHR: Is Exhibit GWD-6 a true and correct copy of the Bureau of Reclamation's 1989 report on Refuge Water Supply Investigations?

WITNESS PETRIE: Yes, it is.

MS. WEHR: Is Exhibit GWD-7 a true and correct copy of excerpts from four websites as of November 2017, including the Ramsar Convention, U.S. Fish and Wildlife Service, Audubon, and the Western Hemisphere Shorebird Reserve Network?

WITNESS PETRIE: Yes, it is.

MS. WEHR: Is Exhibit GWD-8 a true and correct copy of a 2017 Chart of Historic Central Valley Project Water Allocations, published by the Bureau of Reclamation?

WITNESS PETRIE: Yes, it is.

MS. WEHR: Will you be using a PowerPoint presentation to assist in providing your testimony today?

WITNESS PETRIE: I will.

MS. WEHR: Is Exhibit GWD-3 a true and correct copy of that presentation?

WITNESS PETRIE: It is.

MS. WEHR: If you could please pull up Exhibit GWD-3.

We'll turn it over to Dr. Petrie.

WITNESS PETRIE: Good morning. My name is Mark Petrie, and I'm a professional wildlife biologist and the Director of Conservation Planning for Ducks Unlimited. I am an expert in the wetland habitat and food needs of waterfowl.

I will provide a summary of my written testimony and discuss my opinions regarding the importance of reliable water supplies delivered from the Delta to wildlife refuges and the associate effects on bird species in the San Joaquin Valley.

Please go to Slide 2.

The Central Valley is one of the most significant places in North America for migratory birds. The United States has lost more than 50 percent of its wetlands, including more than 90 percent of wetlands in Central Valley. In 1980s, this caused waterfowl populations to plummet.

In response this, in 1986, the United States and Canada established the North American Waterfowl

Management Plan which was approved by Congress in 1989 and expanded to Mexico in 1994.

Slide 3.

The North American Waterfowl Management Plan is implemented by joint ventures. The Central Valley Joint Venture was developed -- was formed in 1998. It's implementation plan has always sought to secure a water supply of suitable quality delivered in a timely manner for optimum management of Central Valley refuges. This is referred to as Level 4 Refuge Water Supplies, based on the findings of a 1989 report on refuges water supplies by the Bureau of Reclamation in 1992.

Congress enacted the Central Valley Project Improvement Act, or the CVPIA, for the purpose of this water supply objective. The CVPIA requires a firm water supply to 19 habitat areas. Two thirds of that supply is called Level 2 Refuge Water and is delivered from the CVP. The additional increment to reach Level 4 is acquired from willing sellers.

Most of the CVPIA refuges are contained within the Grassland's ecological area, or the GEA, which is located in Merced County in the San Joaquin Valley. The GEA contains the largest remaining block of wetlands in the state. This area has received numerous

designations and protections, including a Wildlife Management Area designation by Congress, a Wetland of International Importance under the Ramsar Convention, an Important Bird Area by the Audubon Society, and a Site of International Importance by the Western Hemisphere Shorebird Network.

Next slide, please.

Wetlands in the Central Valley are managed intensively to maximize food production and habitat values. Water is delivered from the CVP in the spring and summer and is used to grow native wetland plants, which provide cover for resident birds to rest and breed. These plants then decay in the fall and winter, creating conditions for the production and provision of food supplies. Food is provided through the release of plant seeds and the growth of invertebrates.

Shallow flooding of these wetlands helps the plants decay and promotes invertebrate growth. Shallow flooding also provides ideal habitat conditions that attract and hold migratory birds throughout the winter. An adequately flooded wetlands also decreases avian crowding by distributing birds across the landscape and reducing probability of disease.

Slide 5.

There are four resulting benefits from

wildlife -- for wildlife from these uses of CVP water.

The first is improved energetics, first, with sufficient food, travel shorter distances in search of food, and they store more energy, so their body condition improves, and they are more likely to survive long migrations.

The second benefit is decreased disease. When birds have enough habitat and are not overcrowded, there is a measurable reduction in outbreaks of fatal diseases such as avian cholera and avian botulism. Improved energetics and reduced disease leads to increase in bird survival, which likely stabilizes or even increases populations of migratory birds.

The next slide, please.

The Central Valley used to contain 4 million acres of wetlands that support 20- to 40 million migratory birds. Now there are fewer than 250,000 acres of wetlands left, which supports six to eight migratory waterfowl, migratory shorebirds, cranes, resident birds like egrets and mallards.

It's worth noting that the Central Valley, despite the loss of these wetlands, continues to support the highest density of breeding waterfowl -- sorry -- of wintering waterfowl in the world.

The delivery of reliable water supplies to

refuges under the CVPIA has helped reverse the decline of migratory birds to the Central Valley. Deliveries of CVP water to refuges south of the Delta also help to maintain the pattern and southward extent of the Pacific Flyway.

Water delivered to refuges is critical for the health and survival of hundreds of avian wildlife species and millions of individual birds each year.

Next slide, please.

CVP water is supposed to be delivered to the refuges on a month-by-month time line in order to provide enough food and to provided enough flooded habitat.

This graph shows the food supply and demand in the refuge if adequate -- sorry -- in the Central Valley if adequate water is delivered in the spring and summer to grow food and if enough flooded habitat is provided in the fall and winter. Ideally, food supplies will not be completed until late March, when spring migration begins and birds begin to leave the valley.

Slide 8, please.

The recent drought gave an example of the impacts that can occur when the refuges do not receive water in accordance with their monthly schedules. In

2014 and 2015, Reclamation reduced Level 2 refuge water deliveries from the Delta and restricted the schedule of water deliveries. Irrigation on the refuges fell by 60 to 70 percent, and the footprint of the flooded wetland habitat decreased by 30 to 40 percent.

Wetland food production diminished by 50 percent causing a lack of adequate food and a decrease in birds. This graph shows that the food supply and food demand were not well matched as they were in the previous slide. Food demand exceeded supply by early January, leaving a lack of food resources for the remainder of the season.

Next slide.

It is my opinion that, if the WaterFix project is operated in a way that decreases the volume, timing, or reliability of CVP water deliveries to the refuges for the Delta, this would cause significant adverse impacts on wetland-dependent species and wetland-dependant avian species. Reduced reliability of water for the refuges would also cause a habitat decline, which leads to decreased or unstable populations over the long term. Reduced irrigation of wetland lands would decrease bird energetics and body condition due to loss of food resources. Reduced food supply and flooded habitat would decrease avian

survival and reproductive rates.

Moreover, an increased crowding of wildlife would increase the risk of fatal avian disease outbreaks.

Next slide, please.

Additionally, it is my opinion that, unless the priority of CVP refuge water supplies and water delivery schedules are upheld, there's a likelihood that certain avian species may decline to the point where they are candidates for listing as special status species or even threatened or endangered. Those species include white-faced Ibis, Sandhill crane, black-necked stilt, peregrine falcon, loggerhead shrike, and tri-colored blackbirds, those species that are shown here on the final slide.

That concludes my testimony.

MS. WEHR: Thank you, Dr. Petrie.

That concludes the direct testimony of Grassland Water District, so I would like to move --

CO-HEARING OFFICER DODUC: Actually, we need to do cross-examination before you do that.

MS. WEHR: Okay.

CO-HEARING OFFICER DODUC: If there is any cross-examination for Dr. Petrie? Just State Water Contractors? Anyone else? All right.

Ms. Meserve.

MS. MESERVE: I just have a couple questions, about five or ten minutes.

CO-HEARING OFFICER DODUC: On behalf of?

MS. MESERVE: Of Group 45.

CO-HEARING OFFICER DODUC: Thank you. You do wear multiple hats.

Ms. Morris.

MS. MORRIS: Thank you. Stefanie Morris for State Water Contractors. I have probably 15 minutes at the most regarding the work -- regarding the long-term water supply contracts and the basis of this witness's opinion as well as his experience reviewing the WaterFix project.

CO-HEARING OFFICER DODUC: Thank you.

CROSS-EXAMINATION BY MS. MORRIS

MS. MORRIS: Good morning. How are you?

WITNESS PETRIE: Good, thank you.

MS. MORRIS: Doctor -- is it Petrie?

WITNESS PETRIE: It is.

MS. MORRIS: Okay. Thank you. Dr. Petrie, have you testified under oath before the Water Board before?

WITNESS PETRIE: I've testified to the Water Board before, but I can't recall if it was under oath.

MS. MORRIS: Okay. Fair enough. And have you testified in a court of law under oath?

WITNESS PETRIE: I have not.

MS. MORRIS: In your professional opinion, is it common practice to offer opinions about potential impacts from projects that you have not evaluated?

WITNESS PETRIE: I don't believe my testimony speaks to the actual evaluation of the WaterFix per se in the Delta. My testimony speaks to the consequences of reduced water supplies in San Joaquin as a potential impact of the WaterFix, which I think is appropriate.

MS. MORRIS: I understand that distinction, so I'm just asking these questions generally, since you've testified as an expert before and you've provided opinions. And I'm not asking as specific to your opinions in this case. I'll get there.

WITNESS PETRIE: Okay.

MS. MORRIS: Okay. But thank you for clarifying.

In your practice when you offer an expert opinion, do you first study whatever the matter at hand is, conduct an analysis, and then and only then render an opinion?

WITNESS PETRIE: I think that's a fair description. Typically, as it relates to this issue, a

water issue, what we will do is we will examine -- we'll examine the consequences of reduced habitat as a result of reduced water supplies and then essentially draw some conclusions about what the likely consequences to birds will be of those reduced water supplies.

We usually do that in the context of the Central Valley Joint Venture Plan, which tends to capture that on a fairly large scale.

MS. MORRIS: Thank you. In general, are the opinions you render supported by facts and findings?

WITNESS PETRIE: I believe so, yes.

MS. MORRIS: And in your view as a professional, would you view it inappropriate for someone to offer an opinion as an expert that has not conducted a thorough analysis of the matter at hand?

WITNESS PETRIE: Yes, I think that's a fair statement.

MS. MORRIS: And have you reviewed the CWF Biological Opinion?

WITNESS PETRIE: I have not.

MS. MORRIS: And have you reviewed the Final EIR/EIS for CWF?

WITNESS PETRIE: I have not.

MS. MORRIS: And have you reviewed the

Biological Assessment for the CWF project?

WITNESS PETRIE: I have not.

MS. MORRIS: And have you reviewed the Mitigation, Monitoring, and Reporting Program for the California WaterFix?

WITNESS PETRIE: No, I haven't.

MS. MORRIS: So is it fair to say that you're not familiar with the CWF project to offer opinions about potential impacts that go beyond what you have analyzed in your written testimony?

MS. WEHR: Objection, misstates his testimony. He's not here to testify about impacts that were evaluated in the documents referenced.

CO-HEARING OFFICER DODUC: I think that's what her question was.

MS. MORRIS: I can repeat it.

CO-HEARING OFFICER DODUC: Yes, please.

MS. MORRIS: Is it fair to say that you are not familiar with the CWF project to offer opinions about potential impacts that go beyond what you have analyzed in your written testimony?

WITNESS PETRIE: I can't testify to the ultimate consequences of the water supplies of the project in the Grasslands or in the area we're talking about.

W hat I can testify to is the consequences of less water in that area. But I cannot testify to whether the project itself will result in less water, only the consequences if in fact that happens.

MS. MORRIS: Okay. Thank you. And your opinions are based solely on your understanding of a potential reduction in water deliveries, correct?

WITNESS PETRIE: Yes.

MS. MORRIS: Your testimony states that these proceedings would change the water rights permits of USBR, DWR, correct?

WITNESS PETRIE: No, I don't think I testified to that.

MS. MORRIS: If we can look at GWD-1, Page 6, Lines 2 to 4.

Actually, if you could just take a look at it when it pops up on the screen in that Page 6. If you could just read that first paragraph, Lines 2 to 9, and then I'll re-ask my question.

WITNESS PETRIE: "The proposed WaterFix project would change the right" --

CO-HEARING OFFICER DODUC: You do not need to read it out loud.

MS. MORRIS: Oh, yeah, sorry. I just wanted you to read it to yourself.

WITNESS PETRIE: What lines again? The first paragraph?

MS. MORRIS: That would be great, 2 to 9.

So my question again, now that you have that statement in mind, is your testimony states that these proceedings would change the water rights permits held by the Bureau of Reclamation and DWR, correct?

WITNESS PETRIE: I don't think I can draw those conclusions. My testimony speaks more to, without appropriate conditions -- well, would be Lines 6 to 9 I think.

MS. MORRIS: And isn't it true that this proceeding is simply to change the point in diversion of USBR, DWR water rights?

MS. WEHR: Objection, calls for a legal conclusion. This is not a legal witness.

CO-HEARING OFFICER DODUC: I believe that's the second statement in that first paragraph. It's in his testimony.

MS. WEHR: Whether or not a change in point of diversion is a change in a water right permit is not a question that Dr. Petrie is here to answer. I think we're drawing pretty fine lines here.

MS. MORRIS: I'm just trying to verify what's in his testimony and what he meant by it because it

does seem to draw legal conclusions. And I just want to --

CO-HEARING OFFICER DODUC: I understand, Ms. Morris. Objection overruled.

When you wrote this testimony, Dr. Petrie, what was your understanding of these proceedings and the changes that might result in the water right permits? It's in your testimony.

WITNESS PETRIE: Sure. My understanding was that there was a possibility that, in fact, it would affect the reliability of the water supply South of Delta to those wetlands.

MS. MORRIS. Okay. And are you familiar with the Grasslands Water District long-term water supply contract with the Bureau of Reclamation?

WITNESS PETRIE: Only superficially.

MS. MORRIS: So you don't have an opinion about the priorities that are in that contract, and you're not offering any testimony about that?

WITNESS PETRIE: No.

MS. MORRIS: Would you defer to the answers provided by Mr. Ortega regarding the application of the long-term water supply contracts?

WITNESS PETRIE: I would.

MS. MORRIS: So, if -- I'll just let that --

is it true your opinion is based solely on the potential for USBR to reprioritize water deliveries and reduce water to refuges?

WITNESS PETRIE: Could you restate --

MS. MORRIS: How about, let me restate this.

WITNESS PETRIE: Sure.

MS. MORRIS: Let's go back to your testimony and look at Page 7. It seems to me that your testimony is based on a potential reduction in water supply; is that correct?

WITNESS PETRIE: That's a fair statement.

MS. MORRIS: So my question is are the opinions you offer in this testimony based solely on potential impacts if that water supply were reduced?

WITNESS PETRIE: Yes.

MS. MORRIS: And then I just want to look at your testimony on Page 7, Line 3, if you could take a look at that. Line 3 to, say, Line 7.

WITNESS PETRIE: That's my testimony, yes. I agree with that statement.

MS. MORRIS: Okay. I just want you to have it in mind when I ask the next question. Thanks.

Is that statement based solely on your concern about water supply being deprioritized due to this project?

WITNESS PETRIE: Yes, beyond what it is or below what it is now.

MS. MORRIS: And then, Mr. Hunt, could you please pull up DWR-1028, Slide 50.

Okay. Can you see the slide in front of you marked DWR-1028, Slide 50? Do you see that this is the average annual results for CVP South of Delta refuge delivery?

WITNESS PETRIE: Yes.

MS. MORRIS: And the table, H3 -- BA H3+ is green; do you see that?

WITNESS PETRIE: Yes.

MS. MORRIS: And the NAA, which is the No Action Alternative, is black?

WITNESS PETRIE: And that's on the left?

MS. MORRIS: Yeah, it's on the far left.

WITNESS PETRIE: Okay.

MS. MORRIS: And then the pink is CWF H3+; do you see that?

WITNESS PETRIE: Yes.

MS. MORRIS: And isn't it true in all circumstances, when you compare the black bar to the rest of the lines on this table, that the deliveries are almost identical?

WITNESS PETRIE: I'm not familiar with these

modeling results, although I think I understand them. The No Action Alternative would be -- could you just define that for me?

MS. MORRIS: Sure the No Action Alternative in the modeling, for your information, to answer this question, is pretty much existing conditions with climate change.

WITNESS PETRIE: Okay. And those other model results are --

MS. MORRIS: Are different scenarios.

WITNESS PETRIE: Okay. So your original question was?

MS. MORRIS: So my question is simply doesn't it show -- if you compare the rest of the alternatives to the No Action Alternative, aren't the delivery results nearly identical in all circumstance?

MS. WEHR: Objection. The witness has testified he's not familiar with this modeling or this document.

CO-HEARING OFFICER DODUC: Ms. Morris.

MS. MORRIS: I'm just asking him to look at the graph and table and answer questions. And he's asked me to clarify a number of things which I have done.

CO-HEARING OFFICER DODUC: All right. I'll

let him answer. But he's just telling you what's on the graph.

WITNESS PETRIE: Sure. There doesn't appear to be any much of a different between those alternatives for the first -- for the No Action Alternative and then the three -- four that follow it.

I'm a little confused about H4, but I wouldn't disagree with what you said.

MS. MORRIS: Okay. Fair enough. And that's my last question. Thank you very much.

CO-HEARING OFFICER DODUC: Ms. Meserve.

CROSS-EXAMINATION BY MS. MESERVE

MS. MESERVE: Osha Meserve, Friends of Stone Lakes National Wildlife Refuge. Good morning.

In your capacity of Director of Conservation, Dr. Petrie, for Ducks Unlimited of the Western Region, do you also work on conservation of avian habitat in the area where the proposed tunnel project is -- would be constructed?

WITNESS PETRIE: Not per se, no. To kind of elaborate on my position, it's -- it's kind of -- I look at those issues on a little larger scale than that, if that's fair. And so the answer to your question is no.

MS. MESERVE: Does the western area, the

Western Regional Office in your position, however, include the Sacramento-San Joaquin Delta?

WITNESS PETRIE: Yes, and we have biologists that work in those areas, including the one you referenced earlier.

MS. MESERVE: And are you aware of any particular conservation efforts that DU is undertaking in the Sacramento-San Joaquin Delta?

WITNESS PETRIE: In general, yes. We're mostly engaged in wetland restoration in that part of the world.

MS. MESERVE: Any specific projects you could mention?

WITNESS PETRIE: Not offhand, really. I know we are -- we're heavily engaged -- or we're engaged in some of the islands where subsidence is a real issue in helping to kind of rebuild those areas so in fact they're not so subject to levee failure.

MS. MESERVE: And that would be in order that those areas could provide habitat for wetland species?

WITNESS PETRIE: Yes.

MS. MESERVE: And would it be fair to say that wetland loss is one of the key concerns overall of Ducks Unlimited?

WITNESS PETRIE: Yes, that's fair.

MS. MESERVE: And why is that?

WITNESS PETRIE: Well, as I stated earlier, the Central Valley, despite losing 90 percent or better of its wetlands, continues to support the highest density of wintering waterfowl in the world. From Ducks Unlimited standpoint, it's one of our six priority landscapes internationally. And essentially, it's the cornerstone of the Pacific Flyway. And there's really not a lot of option for failure here, from our perspective.

MS. MESERVE: Mr. Hunt, if we could go to exhibit LAND-121, which is in the index. And go to Page 22, which is Table 2, please, of 121.

And go to Page 22 of -- this is the Army Corps application for the Delta tunnels project. Can you see -- maybe scroll out so he can see the --

CO-HEARING OFFICER DODUC: Yes. Could we establish whether he's familiar with this document?

MS. MESERVE: Are you familiar, Dr. Petrie, with the fact that this -- the Delta tunnels project would fill wetlands in order to be constructed?

WITNESS PETRIE: I'm not familiar with, I think, the document being -- that was just referenced. I can interpret this table, but the document it comes from I'm not familiar with.

MS. MESERVE: In order to fill wetlands, Dr. Petrie, normally an Army Corps 404 permit would be required?

WITNESS PETRIE: Yes.

MS. MESERVE: And this document is simply the U.S. Army Corps of Engineers' application for wetland fill for this, to clarify.

Can you see, Dr. Petrie, that almost 600 acres of wetlands are proposed to be filled by the Delta tunnels project?

WITNESS PETRIE: That would be -- the second column on the --

MS. MESERVE: In the "Permanent Impact" column?

WITNESS PETRIE: Yes. I'm just looking at your various categories there, some of which -- those are all wetland categories, is that --

MS. MESERVE: It would be wetland categories. This is very inclusive of waters and wetlands, yes.

Just in general, since you work in wetland protection --

WITNESS PETRIE: Could I just ask a question of this table? So the Clifton Court Forebay, is that considered a wetland type? I ask that because it's a pretty good chunk of the acres there in your column.

MS. MESERVE: According to the desktop delineation, I think, from this application, it's just providing the location I believe.

WITNESS PETRIE: Okay. Because a lot of those -- I'm not sure what the definition of some of the --

CO-HEARING OFFICER DODUC: Okay, okay. I'm going to interrupt, Dr. Petrie.

What is the question, Ms. Meserve, that you were going towards?

MS. MESERVE: I was just simply asking him about the overall total of waters and wetland fill depicted in the table.

CO-HEARING OFFICER DODUC: In other words, you're just asking him, for now, to just affirm what is on this page?

MS. MESERVE: (Nods head affirmatively)

CO-HEARING OFFICER DODUC: Just like you did, Ms. Morris.

MS. MESERVE: Just sticking with the 600 acres and acknowledging that there may be various wetland or waters types within that, have you ever heard of another project in California that proposed to fill that many acres of wetlands?

CO-HEARING OFFICER DODUC: Ms. Morris.

MS. MORRIS: Objection, lacks foundation, assumes facts not in evidence.

CO-HEARING OFFICER DODUC: Sustained. Since. . .

MS. MESERVE: I believe this is in evidence, and this is the Department's own application, so I'm not sure how it would be not in evidence.

CO-HEARING OFFICER DODUC: Ms. Meserve, you are making an assumption that all of this is wetlands that would be impacted.

MS. MESERVE: That's what the application says.

CO-HEARING OFFICER DODUC: Well, that's not what this says.

MS. MESERVE: It lists approximate impact acreages, and the permanent impacts are almost 600 acres.

CO-HEARING OFFICER DODUC: And you are -- perhaps I should not have interrupted Dr. Petrie when he was asking about what percentage of this are actually wetlands.

WITNESS PETRIE: Well, I know that terms -- it varies in terms of some of the terms we associate with different wetland types. Some of these terms I certainly recognize as wetland types. Whether they're

emerging wetland or vernal pools, certainly they would qualify as wetlands as I understand the terms. There are some other categories there that I would have to know more about if I could in fact determine if they were -- they were wetlands, functional wetlands.

MS. MESERVE: I understand. Just looking at the overall number of acres, my question was simply have you ever heard of a wetland fill application that was on this scale?

CO-HEARING OFFICER DODUC: Ms. Morris.

MS. MORRIS: Again, objection assumes facts not in evidence. Again, this is not all wetlands.

CO-HEARING OFFICER DODUC: Sustained.

MS. MESERVE: If, for instance, only half of this was considered wetlands, according to your own definitions, have you ever heard of a wetland fill application for that many acres of wetlands?

CO-HEARING OFFICER DODUC: Ms. Morris.

MS. MORRIS: Calls for speculation, incomplete hypothetical.

CO-HEARING OFFICER DODUC: From your experience, Dr. Petrie, can you recall what is the -- can you recall a project, a wetland project that has -- what, from your experience and knowledge, what would be the largest project that involved wetlands impact that

you're aware of?

WITNESS PETRIE: I can't hang an acre figure on that. Certainly we have been involved in involved in and are aware of projects that impact that size. But they're typically almost self-mitigating projects where, in fact, moving dirt will actually fill some wetlands.

But in fact, that kind of activity is actually compensated on site by increasing the acreage of wetlands on the site itself. So I can't really speak to -- I can't really put this in context for you very well in terms of whether -- how proportionate it is to other examples out there, either way. Certainly it seems like a big number.

MS. MESERVE: And just assuming that this is wetland fill that would be required to be mitigated and which is not for restoration purposes, would you be concerned if the mitigation for this wetland fill was far away from the location of the impacts?

WITNESS PETRIE: I think that probably depends on the species you're talking about. Some species, I think, are better able to adapt to those mitigation conditions, some less so. The more mobile ones, probably; the less mobile ones, less likely.

MS. MESERVE: And are you aware that the Delta

is one of the wintering locations for the greater Sandhill crane?

WITNESS PETRIE: I am.

MS. MESERVE: And would protection of wintering areas for the greater Sandhill crane be within the area of interest of Ducks Unlimited in general?

WITNESS PETRIE: It would.

MS. MESERVE: And so if a project would disturb, through wetland fill or other construction activities, greater Sandhill crane, that would be a concern as well to DU?

CO-HEARING OFFICER DODUC: Ms. Morris.

MS. MORRIS: Thank you. Objection, calls for speculation, incomplete hypothetical. Specifically, the witness has already testified he hasn't looked at the mitigation. He's already testified that it depends on the species, how far apart it is. And we haven't made -- all of those facts are not evidence, so it would be speculative to answer this question.

CO-HEARING OFFICER DODUC: Ms. Morris, I believe her question was more general than that.

Ms. Meserve.

MS. MESERVE: That's right. And I have no further questions. Thank you.

CO-HEARING OFFICER DODUC: Did you want an answer from Dr. Petrie to that last question?

MS. MESERVE: He did answer it.

WITNESS PETRIE: I agree that the detrimental effect to Sandhill cranes would be a concern, if that's some other thing. Was that your question?

MS. MESERVE: Yes, thank you.

CO-HEARING OFFICER DODUC: Thank you, Ms. Meserve.

Seeing no other cross, Ms. Wehr, any redirect?

MS. WEHR: No redirect, thank you.

CO-HEARING OFFICER DODUC: All right. And does that complete your case in chief?

MS. WEHR: That does. And I would move to enter Exhibits GWD-1 inclusive through GWD-21 into evidence.

CO-HEARING OFFICER DODUC: Any objections?

(No response)

CO-HEARING OFFICER DODUC: Not seeing any, so moved.

Thank you Ms. Wehr, and thank you, Dr. Petrie.

MS. WEHR: Thank you.

WITNESS PETRIE: Thank you.

(Grassland Exhibits GD-1 through GD-21 admitted into evidence)

CO-HEARING OFFICER DODUC: I believe we are now on to the San Joaquin Tributaries Authority.

MR. O'LAUGHLIN: Would you mind giving us five minutes to set up?

CO-HEARING OFFICER DODUC: Let's do that, and we will return at 10:15.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It is 10:15. We're back in session.

And before I turn it over to Mr. O'Laughlin, may I ask Mr. Steiner to stand and raise your right hand, Dr. Paulsen having taken the oath last week.

(Witnesses sworn)

DANIEL STEINER and DR. SUSAN PAULSEN,
called by Protestant Group 18 as
Panel 1 witnesses, having been duly
sworn, were examined and testified
as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you, Mr. Steiner.

Mr. O'Laughlin -- oh.

MR. WASIEWSKI: Tim Wasiewski, for the San Joaquin Tributaries Authority.

MR. O'LAUGHLIN: Good morning, Tim O'Laughlin for the San Joaquin Tributaries Authority.

We feel pretty confident we can do it within the 40 minutes. And so we're going to do Mr. Steiner first, and then Dr. Paulsen second.

CO-HEARING OFFICER DODUC: All right.

MR. O'LAUGHLIN: Mr. Steiner, is SJTA Exhibit 301 a true and correct copy of your statement of qualifications?

WITNESS STEINER: Yes, it is.

MR. O'LAUGHLIN: And is SJTA-302 and 303 true and correct copies of your testimony?

WITNESS STEINER: Yes, it is.

MR. O'LAUGHLIN: Would you summarize for the Board your testimony, please?

WITNESS STEINER: I was asked by counsel to the San Joaquin Tribs to investigate and report on some of the modeling that was done for the CWF. The focus was specifically to the assumptions for the San Joaquin River operations and, in particular, the compliance of the models -- I should say the operations modeled in the CWF studies to D1641, particularly the Vernalis flow requirements.

My investigation found that -- I focused primarily on the No Action Alternative. My understanding of the CWF's studies were that I could start with the No Action Alternative and its

assumptions for the San Joaquin River. And those assumptions that would be embedded in the No Action Alternative would be similar if not exactly the same for all the Alternatives so that whatever I found for the modeling assumptions for the NAA I would also find consistent in all of the alternative assumptions -- all of the alternative studies.

When I investigated the CalSim studies, it led me to a couple of conclusions. One of them that was the incorporation of climate change within the No Action Alternative as compared to a common current condition operation -- for instance, in DCR15, the current reliability report of the State Water Project, which is modeling current conditions as opposed to a future condition with climate change -- was that the application of the D1641 requirement at Vernalis for flows would result in a lesser flow -- let's say the same flow requirement but the performance of that flow requirement would be lesser. Let's just say there are more critical years embedded in the CWF studies, in both the Alternatives and the NAA.

That was caused by the effect of hydrology in the climate change scenario, which it essentially made, in terms of the triggering device of the 60-20-20 for the San Joaquin index, it made it look drier. And that

index is one of the parameters that leads to the flow requirement at Vernalis.

It turned out that it affected essentially 20 percent of the years, making those years less -- drier, I would say, at Vernalis and -- under the current conditions -- it's just I think in one of the findings I found -- which would mean that there would be less flow required at the station in the future condition modeled in the CWF studies.

The -- in drier years, that resulted in -- for instance that, if you had X number of years classified as dry, you would find that I believe 60 percent of those years would now be classified as dry. All that leads to the fact that there would be less water required at Vernalis, and if it didn't happen incidentally, it'd be done by upstream operations; there would be less water at Vernalis in the future.

The second area I investigated then was actually what was the performance of D1641 at Vernalis in the modeling studies. And I found that, as literally described in the assumptions for the Vernalis operation, that the operation, as far as requirement that was being held at Vernalis under D1641, did not include what we call the pulse flows during April and May. It was only run to provide a compliance with the

base flow requirements of Table 3.

So instead of normally we'd see a base flow from February to June provided by -- in this case Melones is the only one that's assumed to have responsibility for those flows --

(Reporter interruption)

WITNESS STEINER: New Melones, that's right.

That the only facility assumed to provide performance to D1641 at Vernalis is the New Melones project on the Stanislaus River. That operation was tempered to only provide the base flow requirements in February to June, not inclusive of the pulse flows.

And if you could bring up my exhibits --

303, Table 4.

I'm sorry for the small print. These are the results of my analysis that interpreted the results of -- yes. That -- this is the conclusion in terms of we have a requirement that's assumed in the CWF studies, both No Action Alternative and the Alternatives.

This is what I would call a deficit between making flow at Vernalis, both -- all of Table 3, both the base flow and the pulse flow component during February to June.

What you're seeing here is if there was no

action taken by anyone in the basin, and this would be inclusive of New Melones, this is the shortfall beside -- between incidental flow operations from all the tributaries running to their own requirements, and the requirement at Vernalis under D1641 in that future No Action condition.

These are the shortfalls by year, by period in that case. What's to be pointed out is there are not many shortfalls during the February through first part of April or the post mid-month May month periods. The primary shortage is during the pulse flow period, during the 31-day period where we're trying to put pulse flow out. The amount of shortage that we're --

MR. O'LAUGHLIN: Dan, can I interrupt for a second?

WITNESS STEINER: Mm-hmm.

MR. O'LAUGHLIN: On the chart which is the summary of your analysis, can we focus on April 15th to April 30th? And you have two columns there. One is "Deficit NAA," and one is "Deficit DCR15." Can you explain what those different columns are?

WITNESS STEINER: I looked at this under two conditions primarily because of I'm having to deal with the CWF, which is looking under the climate change scenario, while I'm more used to also looking at what

we're looking at out the window today, the current conditions.

The DCR15 represents the DWR latest reliability report for current conditions.

MR. O'LAUGHLIN: So one other question on this. If you can look on the graph and go down April 15th columns again to 1993, it says 113,875 [sic]; is that acre-feet?

WITNESS STEINER: Yes, it is.

MR. O'LAUGHLIN: Okay. And that would be the deficit that would occur under NAA in a 15-day period in 1993; is that correct?

WITNESS STEINER: That is correct?

MR. O'LAUGHLIN: And then if you looked at the 1993 again, doing the DCR15 run, there's a difference in that time period. And it goes up to 168,226 thousand [sic] acre-feet; is that correct?

WITNESS STEINER: That is correct.

MR. O'LAUGHLIN: So one question I have to ask is, so, when we switch to May again, the columns and the runs remain the same. I was wondering are these separate amounts in those separate columns? In other words, is the 60,037, should that be additive to the 113,875 to get a total deficit for the 30-day pulse flow period under that run?

WITNESS STEINER: That is correct.

MR. O'LAUGHLIN: So in 1993, just looking at the 31-day pulse period and excluding March, early April, and late May, depending on the run, you're bumping close to 200-, to 300,000 acre-feet of deficit; is that right?

WITNESS STEINER: That is correct.

MR. O'LAUGHLIN: Go ahead. You can finish summarizing your testimony. I think you have one minute left.

WITNESS STEINER: The end result is this lays out -- you're seeing in Table 4, by stacking of the year types from the wettest to the driest years -- if you roll to the bottom, you'll see the more critical years.

The critical year category is that bottom section of data there -- not the year type. The averages are presented on the very bottom. But you have the dry years stacked there in that first block that has a lot of white zone on both sides of the 31-day period. You then get to the dry years above that, your below normal years and above thereafter.

What you are seeing here is that there's a very consistent shortage of water during the dry and critical years in all years, essentially, during the

pulse flow period that are not met in the studies at this point. To point out what this means is that the studies are not representing a full compliance to D1641 as pertains to Vernalis flow requirement so that any resultant -- result that's dependant on Vernalis flows being there -- and if you're assuming that -- it's an awareness at this point that I know Vernalis flows affects exports from the South Delta.

And if you're not modeling the full compliance for D1641, you'll be getting a different answer at the exports under these studies if you had assumed full compliance of D1641.

So it's been more of an awareness of expectations of what you can draw out of the studies.

MR. O'LAUGHLIN: And Mr. Hunt, can you scroll to the top again, please, of the exhibit. Thank you. I just have -- so we get the column -- that's fine.

One other quick question in regards to compliance. So look at the first column, which is February. And it's 1967. And under that column it says -- under both of them it appears that there's roughly approximately a 45,000-acre-foot deficit at Vernalis.

Is that the February through June base flow amounts that you've been talking about?

WITNESS STEINER: That is correct. Now, in these studies, I point that out because my task was to find out how short is incidental operation to D1641 compliance even without -- even with New Melones.

That 45,000 there in February June, outside of the pulse flow period, those numbers represent what is included in the CWF studies but is met by New Melones alone.

MR. O'LAUGHLIN: Thank you. Are you done summarizing your testimony, Mr. Steiner?

WITNESS STEINER: Yes, I am.

MR. O'LAUGHLIN: Thank you very much.

Dr. Paulsen, welcome back.

WITNESS PAULSEN: Good morning.

MR. O'LAUGHLIN: You should get your own chair here by now.

Dr. Paulsen, is SJTA-304 Errata a true and correct copy of your testimony?

WITNESS PAULSEN: Yes, it is.

MR. O'LAUGHLIN: And is SJTA-305 Errata a true and correct copy of your revised PowerPoint?

WITNESS PAULSEN: Yes.

MR. O'LAUGHLIN: And are SJTA-306 and 307 also true and correct copies of your testimony?

WITNESS PAULSEN: Yes.

MR. O'LAUGHLIN: And your qualifications have already been submitted, correct? You've got to answer audibly.

WITNESS PAULSEN: Sorry, yes.

MR. O'LAUGHLIN: Dr. Paulsen, would you care to testify [sic] your testimony? And I believe you're going to use your PowerPoint to assist you.

WITNESS PAULSEN: Yes, please.

Could we please have SJTA-305 Errata. And while that's coming up, there's one minor correction I'd like to make in SJTA-304 Errata. In reviewing this yesterday, I found a miss -- well, it's not clear what. I'd like to do is to make a minor amendment on Page 3, in Lines 23 and 24.

And the existing sentence reads, "This work was performed using existing DSM-2 fingerprinting results generated by DWR during Part 1 of the WaterFix change petition proceedings acquired May 2016."

I'd like to modify that sentence by adding the words "for Scenario H4," comma, to the beginning of that sentence. And then to add a further clarification that would read, "For scenario EBC2, the work was performed using DWR's DSM-2 input files obtained in 2013."

MR. O'LAUGHLIN: Thank you.

WITNESS PAULSEN: All right. And then, sorry, back to SJTA-305 Errata. And if you could go down a slide, please. Thank you.

The testimony I'd like to present today consists of two opinions. Both of those opinions have to do with the fate of San Joaquin River water within the Delta. And the first opinion, we looked at what happens to San Joaquin River water that enters the Delta between February 1st and June 30th so I'll probably refer to that as the February to June San Joaquin River inflow.

And we looked at what happens to that water in below normal, dry, and critical years. And as I'll explain, what we found is that most of the San Joaquin River water that enters the Delta in that February to June time period is either consumed within or diverted and exported from the Delta.

And then the second opinion has to do with evaluating the fraction of San Joaquin River water that is exported from the Delta under the WaterFix scenarios and focusing again on the dry and the critical water years.

We looked at that because with the WaterFix scenario we'll have a new North Delta diversion location which will export primarily Sacramento River

water. So we were curious to determine if that made a significant difference in the fate of San Joaquin River water that enters the Delta under the WaterFix scenarios.

Next slide, please.

The way we did this work was to use DWR's DSM-2 runs or input files and to use the volumetric fingerprinting functions to evaluate the fate of the San Joaquin River inflows for the existing conditions scenario, EBC2 -- that's the one that has Fall X2 -- and for Scenario H4.

The way we did this was to tag the San Joaquin River inflows between February 1st and June 30th so that we could then track them within the model domain as that water propagated through the Delta. We tabulated those fingerprinting results to show the amount of San Joaquin River water that would -- flowed into the Delta in that time period and that was later exported via the CVP or the SWP or at a couple of other locations and, again, in the critical, dry, or below normal water years.

Next slide.

So the first opinion has to do with what happened to those inflows under both the existing condition and the WaterFix Scenario H4.

Next slide, please.

And I'll take a moment just to walk through. I've got three slides here that show an example critical year, an example dry year, and the sole below normal year in the 16-year DSM-2 model period.

So this first slide shows the simulation results for Scenario H4 for the critical water year of 1977. And what you see in the top panel, the lines start at February 1st. The dark blue line that's at the top shows the San Joaquin River inflow into the model domain through that period.

And you can see it's largely in step functions. They're slightly smoothed at the transition between months. But what you can see is that there are roughly just over 3,000 acre-feet of San Joaquin River water that flows into the Delta in February, declining to about 2.3-or-so-thousand acre-feet in March, et cetera. And then the dashed lines, the dashed blue line shows the fraction of that San Joaquin River tagged inflow that is exported via the Tracy Pumping Plant -- and that's the Central Valley Project. And the dashed orange line shows the amount that is pulled out of the Delta by the State Water Project at Clifton Court.

The Contra Costa Rock Slough diversions are

shown as the gray dashed line. That's largely along the bottom of the chart. And the dashed yellowish line shows the amount of tagged San Joaquin River water that flows in at Vernalis and then that leaves the Delta as Delta outflow.

The second graph shows the same information as cumulative flows. And what you can see is that, in that February-to-June time period, on the order of 400,000 acre-feet of San Joaquin River water flows into the Delta. Here, the only difference between the top graph and the bottom graph beside displaying it in cumulative format shows the combined State Water Project and Central Valley Project exports. So of that roughly 400,000 acre-feet that flows into the Delta in that time period, on the order of 120,000 acre-feet is exported.

So approximately 38 percent of the San Joaquin River inflows in the February-to-June time period are exported by the two South Delta pumps. You can also see the fraction that makes it out as Delta outflow, and it's on the order of 0.3 percent.

The other thing you can see here is that that San Joaquin River inflow that enters the Delta on February 1st shows up at the South Delta pumping locations after just a few days.

MR. O'LAUGHLIN: Dr. Paulsen, real quick, when you're looking at these three graphs -- so you have the CVP and SWP; you have the Tracy Pumping Plant, Clifton Court, Contra Costa, and then you show the Delta outflow both in a cumulative and a percentage manner. What happens to the difference between those diversions and the rest of the water that goes to outflow?

WITNESS PAULSEN: Thank you for reminding me to say that. The difference is presumed to either stay within the Delta or to be consumed in the Delta as in-Delta consumptive use. And actually, the majority of it is consumed in the Delta as in-Delta consumptive use.

All right. The next slide shows the same thing for 1985, water year 1985, which is a dry water year. In the top panel again, the dark blue line shows the San Joaquin River inflow to the model domain in the February-to-June time period. That's the flow that was tagged. And the dashed blue and orange lines show the Central Valley Project and State Water Project exports of that water. And the dashed yellow line shows the Delta outflow. And the gray line, the dashed gray line, shows the Contra Costa diversions.

What you see in the second panel is the cumulative flow expressed as thousand acre-feet and, in

the bottom panel, the percent of that water on a cumulative basis. And, again, what's not shown here is the in-Delta consumptive use, which is essentially the remainder.

And the next slide shows the Scenario H4 results for water year 1979, which is the sole below normal water year in that period of record. Again, the top panel, the dark blue line is the San Joaquin River in flow in that February-to-June time period. The dashed lines, the blue one is the Tracy exports; the orange dashed line is the Clifton Court exports; and the yellow dashed line is the Delta outflow.

For these water years, we've then, on the next slide, tabulated the results that we've been looking at. And we've done that for both the existing condition run on the left and the H4 scenario, which is on the right.

What you can see is that, if we just walk across one row, for 1977, which is a critical water year, for the existing conditions run, we can see that about 39 percent of the San Joaquin River water that entered the Delta between February and June is pumped out via the CVP pumps. And about 15 percent of that inflow is pumped out by the State Water Project. So collectively, about 54 percent of the San Joaquin River

water that flows into the Delta in that time period is pumped out via the South Delta export locations.

About 0.1 percent, or a tenth of a percent of the San Joaquin River water that flows into the Delta in that time period makes it to Delta outflow. And the remainder -- so on the order of 45 percent -- is consumed within the Delta as in-Delta consumptive use.

Now, for the H4 scenario for a critical water year, the amount of San Joaquin River water that flows into the Delta in the February-to-June time period that has been exported goes down. It was 54 percent for EBC2. And for H4, it's on the order of 38 percent. And the slightly higher amount of that inflow makes it out of the Delta as Delta outflow, 0.3 percent of the San Joaquin River inflow in February-to-June time period makes it out.

And then you can see for dry water years for EBC2 in 1985, 77 percent of the water was exported by the CVP and SWP in the existing condition. For the H4 scenario, 57 percent of that inflow is exported. And the amount of San Joaquin River inflow that makes it out of the Delta is 1 percent or less for both those scenarios.

And then for the below normal water year, you can see that, in the existing condition, about

60 percent of the inflow is exported by those two pumping locations, those two export locations. And for the H4 scenario about 32 percent of the inflow is exported by the two pumps.

MR. O'LAUGHLIN: Dr. Paulsen, just real quick, so, but in regards to the study that you did and especially looking at 1979, there was only one below normal year you could grab from the study period; is that correct?

WITNESS PAULSEN: That is correct.

MR. O'LAUGHLIN: Okay. So trying to say that this may occur in all below normal years under all year types, we wouldn't know. This is just one snapshot in time for one year; is that correct?

WITNESS PAULSEN: Well, this is what happens in that below normal water year.

MR. O'LAUGHLIN: -- normal year. That's a good way to put it.

WITNESS PAULSEN: We don't have another below normal water year in the 16-year period to evaluate if the same thing would happen during another below normal water year because we don't have one.

MR. O'LAUGHLIN: Thank you.

WITNESS PAULSEN: All right. If we go to the next slide. This figure shows, for all of the

critical, dry, and below normal water years, the total amount of water that is exported from the Delta by the CVP and the amount of that water that came from, originated from the San Joaquin River.

So for example, in 1976, which is a critical water year, you can see that on the order of 2,150 thousand [sic] acre-feet -- or 2.15 million acre-feet of water are exported by the CVP pumps. And of that, on the order of 700,000 acre-feet originated from the San Joaquin River. So a substantial fraction of the water in these water year types that is exported by the CVP is San Joaquin River water. And these are water year totals.

That -- this slide, Figure 4, shows that for the existing condition. The next slide, Figure 5, shows the same calculation performed for the H4 scenario. And you can see that the total amount of water that's exported by the CVP pumps goes down. So in the last slide for 1976, for example, it was on the order of 2100- or 2200 thousand [sic] acre-feet that was exported. Here it is about 900- or 950,000 acre-feet that is exported by the CVP pumps in 1976. Of that amount, just under half of it originated from the San Joaquin River.

So what we conclude is that a substantial

fraction of the San Joaquin River water that flows into the Delta in the February-to-June time period is exported or used consumptively within the Delta and that a substantial fraction of the water that is exported from the Delta as a whole originated from the San Joaquin River.

The second opinion --

Next slide, please. Thank you.

-- looks at how much water -- where the water that's exported from the South Delta originates. What we see is that in dry and critical water years, a large fraction of the water that is exported from the South Delta -- or a large fraction of the water that's exported from the Delta is exported from the South Delta export locations.

So in the next slide -- and this was a correction that was made in the errata. We made an error in copying the tables. These are the corrected tables, which is indicated by the red.

For the top frame, what you see in the green bars is the total amount of water that is exported on average in critical water years during each month from the South Delta export locations combined. So, for example, in October of critical water years just over 6,000 cfs is exported from the CVP and SWP locations.

Of course, in the exiting condition, we don't have North Delta diversions, so that all shows up as a solid-colored bar.

Just to the right of that is the results for the H4 model scenario. And what you see is that in yellow, the bottom part of the bar in October of critical water years, that is the amount of water that is exported from the South Delta locations and the top part of the bar is the amount that's exported from the North Delta diversion locations.

If you look at some of these months, you can see that the total amount of water that is exported from the South Delta locations is much greater than the amount that's exported from the North Delta locations.

So for example, if we look at the December critical water year average bars you can see that probably on the order of 90 percent of the water that's exported from the Delta in the H4 scenario is exported from the South Delta pumping locations, and maybe on the order of 10 percent is exported from the new North Delta diversions.

You can also see the annual average on the far right-hand side. For critical water years, again, on the order of three quarters of the water that is exported is exported from the South Delta export

locations rather than the North Delta diversion locations. So that top panel shows the average for critical water years.

The bottom panel shows the same thing for dry water years. Again, the green bar shows the monthly average amount that's diverted from the Delta from the South Delta export locations for the existing conditions, and the two colored bars just to the right of the green bar show the amount of water that's exported from both the South Delta export locations and the North Delta export locations.

MR. O'LAUGHLIN: So I have a specific focus on this one. So if you could look at April, under Figure 6B. So if I'm looking at this graph correctly, the existing condition, the green bar, would be approximately 1500 cfs of diversion, Banks and Jones combined; is that correct?

WITNESS PAULSEN: Yes.

MR. O'LAUGHLIN: Okay. And then if we went to an H4 scenario, it appears that, based on the modeling that you did, that there would be increased pumping at Banks and Jones in April in dry years over and above what currently exists; is that correct?

WITNESS PAULSEN: Yes.

MR. O'LAUGHLIN: And then on top of that in

April, there's an adaptive part which we call the North Delta diversions, which is depicted in red on top of that. So for a total diversion, I don't know, 4500, 5,000 cfs, ballpark?

WITNESS PAULSEN: Yes, on that order.

MR. O'LAUGHLIN: Okay. So how -- and that also occurs it looks like in May, as well, in the drier years, that there's increased exports under this condition in March as well; is that correct?

WITNESS PAULSEN: Yes. The total amount of exports in those months -- March, April, and May -- of dry years on average is greater than the total amount of exports under existing condition.

MR. O'LAUGHLIN: In February it appears that it's pretty close. It looks like it's almost the same under existing conditions and exports.

WITNESS PAULSEN: Right. The total amount of water exported in February on average for dry years is slightly higher for the H4 scenario than it is for the existing conditions.

MR. O'LAUGHLIN: So how, with increased exports in the South Delta in a dry water year is San Joaquin River water going to be hydrologically -- hydraulically connected to the Bay?

WITNESS PAULSEN: Those were some of the

results that we showed earlier in that most of the San Joaquin River water that flows into the Delta under these year types is either exported, a substantial fraction of it is exported from the Delta via the South Delta pumps, and a large fraction of the remainder is used consumptively within the Delta. So only a small fraction makes it out to the bay.

MR. O'LAUGHLIN: Would it be safe to say that, under this scenario, Figure 6B, that you would, given the supply of water entering the Delta, that California WaterFix under this scenario would diminish the ability of getting San Joaquin River water to the Bay in the April-May time period?

WITNESS PAULSEN: I mean, certainly -- it's hard for San Joaquin River water to make it out to the Bay right now. And especially in the month of April, where you'd be exporting more water from the South Delta diversion locations, you'd be exporting more San Joaquin River water as well.

MR. O'LAUGHLIN: Thank you.

WITNESS PAULSEN: All right. And then the last slide here is Figure 6C. And these are the results for the below normal water year. Again, there's only one below normal water year, so these results are for this year rather than for -- as an

average for the year type.

And when you can see, again, is the green bars showing the amount of water exported in the existing condition. And then the colored bars, the amount of water that's exported from both the South Delta export locations and the new North Delta diversion locations for the H4 scenario.

And, again, you can see for particular months, a large fraction of the water that's exported from the Delta continues to be exported from the South Delta export locations.

And that concludes my testimony. Thank you.

MR. O'LAUGHLIN: Thank you, Dr. Paulsen.

No further questions.

CO-HEARING OFFICER DODUC: Thank you, Mr. O'Laughlin.

May I get an estimate from all those who wish to cross-examine this panel?

Ms. Ansley.

MS. ANSLEY: I estimate 20 to 30 minutes, and I have no questions for Mr. Steiner.

CO-HEARING OFFICER DODUC: All right.

Mr. Herrick.

MR. HERRICK: John Herrick, South Delta parties. Maybe a hald hour at the max.

CO-HEARING OFFICER DODUC: For both or --

MR. HERRICK: Both, combined.

CO-HEARING OFFICER DODUC: Combined.

So, Mr. Steiner, you don't get to leave us.

Mr. Jackson.

MR. JACKSON: Yes, 30 minutes for both.

CO-HEARING OFFICER DODUC: All right. We will begin, then, with Ms. Ansley.

CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: Can we call up testimony SJTA-304 Errata please. And can we go to Page 3. And I just want to clarify Lines 3 through 5 with Dr. Paulsen.

So I believe I heard you testify earlier that you received the DSM-2 volumetric fingerprinting modeling files or scenarios from the DWR; is that correct?

WITNESS PAULSEN: In part. We used the DWR input files to simulate the fate of the February-to-June San Joaquin River inflows. We also did look at the total amount of San Joaquin River water that was exported, and I believe that we pulled directly from the H4 model files.

For EBC2, we used the model input files that were provided in 2013, as I clarified earlier. And we do not -- we did not have fingerprinting output from

those. But the input files contained the information necessary to do the fingerprinting runs, so we used those input files as provided by DWR to obtain those results.

MS. ANSLEY: You're familiar with the FEIR's Appendix 8(d) which contains the volumetric fingerprinting analysis by the DWR, correct?

WITNESS PAULSEN: I have reviewed those in the past.

MS. ANSLEY: So is your fingerprinting analysis submitted as an exhibit to your testimony?

WITNESS PAULSEN: There are -- it is, I think, SJTA-306.

MS. ANSLEY: Are those your output files?

WITNESS PAULSEN: Those are not the output files, but those are figures that are created from the output files that indicate what those output files contain.

MS. ANSLEY: Okay. We'd like to request from you and your attorney that we be provided with the modeling output files for your fingerprinting analysis.

CO-HEARING OFFICER DODUC: Any objections to that?

MR. O'LAUGHLIN: I'll confirm and get back.

CO-HEARING OFFICER DODUC: Later today?

MR. O'LAUGHLIN: Mm-hmm.

CO-HEARING OFFICER DODUC: Thank you.

MS. ANSLEY: In your Footnote 2 on Page 3, I believe -- if we could probably scroll down, it's probably at the bottom of this page. Blow it up.

You state that you chose H4 because it includes spring outflow; is that correct?

WITNESS PAULSEN: Yes.

MS. ANSLEY: Is it your understanding that the BA H3+ modeling also included spring outflow requirements?

WITNESS PAULSEN: I believe it did. I have that all tabulated. I could look and confirm, but I think that's correct.

MS. ANSLEY: I'm really just asking for your understanding. If you'd like to look it up --

MR. O'LAUGHLIN: Yeah, look it up.

MS. ANSLEY: -- that's fine.

MR. O'LAUGHLIN: We're here all day.

WITNESS PAULSEN: Yes, I believe that's correct.

MS. ANSLEY: Do you have an understanding of the outflow requirements, the spring outflow requirements for the adopted project, CWF H3+?

WITNESS PAULSEN: We have started to look at

CWF H3+. I don't have any finalized analysis for that scenario yet. We didn't have those -- just to be clear, we didn't have those modeling files before we prepared this testimony or submitted this testimony at the end of November.

MS. ANSLEY: Maybe if we could call up Dr. Paulsen's PowerPoint presentation, SJTA 305 Errata. And can we go to the first slide? Thank you.

Look at your Opinion 1 there, which I won't repeat, but is your Opinion 1 true for both the existing condition as well as the H4 in your analysis?

WITNESS PAULSEN: That very little San Joaquin River water that enters the Delta in that February-to-June time period makes it out of the Delta as Delta outflow?

MS. ANSLEY: Yes.

WITNESS PAULSEN: Yes.

MS. ANSLEY: Is the same true of your Opinion 2? Is the conclusion that you make in Opinion 2 also correct for both the existing condition EBC2 that you analyzed as well as the H4 scenario that you analyzed?

WITNESS PAULSEN: Yes.

MS. ANSLEY: Okay. Based on your -- I assume that you've reviewed the FEIR modeling analysis or

results?

WITNESS PAULSEN: We -- I have not reviewed the entire FEIR because it's voluminous. We have made our best attempt to review the portions of it that we believe are relevant to this testimony and the testimony that we've presented on behalf of other parties here.

We've focused our review primarily on the model runs themselves rather than on the FEIR, but we did review select portions of the FEIR as they related to that analysis.

MS. ANSLEY: Yes. And I apologize. I did not mean to imply that you read the entire FEIR including things --

WITNESS PAULSEN: Thank you.

MS. ANSLEY: -- that wouldn't apply to your things.

Can we call up DWR-1028, Slide 22, please.

Based on your review of the modeling to date in this proceeding, is it your understanding that the CVP and SWP meet the Delta outflow requirements under both the NAA and WaterFix? How about let's start with BA H3+? And that's not these graphs.

WITNESS PAULSEN: I haven't reviewed that.

MS. ANSLEY: Have you reviewed these figures

which show D1641 compliance under Alt 4A H3+?

WITNESS PAULSEN: Only in a cursory fashion.

MS. ANSLEY: From that cursory review, is it your understanding that the CVP/SWP meet the Delta outflow requirements under both the No Action Alternative and the WaterFix Alt 4A H3+?

WITNESS PAULSEN: I didn't develop an opinion about that.

MS. ANSLEY: Can we go back to Dr. Paulsen's PowerPoint presentation and her slides, 305 Errata. And I'm on my last line of questioning, which I realize I didn't give to you, but I'm down to my last few questions, hopefully.

CO-HEARING OFFICER DODUC: I thought Dr. Paulsen's testimony was quite contained.

MS. ANSLEY: Yeah, it's very contained, and I just want to circle back now.

Even though we've already established that the results for the EBC2 and that these conclusions are true for your results of your analysis for both the EBC2 and the H4 runs, what is the significance, the -- what is the biological significance of your Opinion 1? Do you provide that in your testimony?

WITNESS PAULSEN: No. I am not an expert in fish or other biota. We provide this information as

potentially useful to the State Water Board in developing flow criteria and is potentially useful to other experts in this proceeding in evaluating the biological impacts.

MS. ANSLEY: So as you sit here today, you don't know how a change in a fraction of water, San Joaquin fraction of water, exported from the Delta or the change the in Delta outflows constitute an effect on fish, wildlife, or recreation?

WITNESS PAULSEN: I didn't develop an opinion on that, no.

MS. ANSLEY: Are you aware of any studies that show that a change in the fraction of San Joaquin River water in the outflow, the Delta outflow, has any biological significance?

WITNESS PAULSEN: Again, I haven't developed any opinions on that issue.

MS. ANSLEY: Have you developed and does your testimony include any tie-in to the public interest in terms of your conclusions regarding fractional shares of Delta outflow made up of San Joaquin River water?

WITNESS PAULSEN: No. Again, I haven't developed any opinions on that particular issue, just providing this analysis to show how much San Joaquin River water leaves the Delta as Delta outflow under

conditions that we've described.

MS. ANSLEY: But you're not aware of the implications of your findings.

WITNESS PAULSEN: I haven't developed any opinions beyond what you see here.

MS. ANSLEY: Are you aware of anyone else put forward by the San Joaquin Tributary Authority that does make that connection to Part 2?

MR. O'LAUGHLIN: Objection, attorney-client work product privilege. And that's not subject to disclosure yet because, based on the ruling that were made earlier last year, that testimony will come later.

MS. ANSLEY: As far as I know, this is Part 2. So we've done Part 1, which is impacts to legal users of water. This is Part 2, which is --

MR. O'LAUGHLIN: Yeah, but Part 2 is -- since you guys were dilatory in getting your stuff done and in on time, we will back in with our appropriate -- our recommendations on appropriate Delta flow criteria in this proceeding. But it was only after we received your H+ 44++. So it will come later.

CO-HEARING OFFICER DODUC: Sustaining the objection.

MS. ANSLEY: Okay. Can I ask if any testimony submitted in Part 2 makes this tie-in?

Are you aware of any testimony by any protestant that uses -- that has been submitted and is obviously a matter of public record now -- are you aware of any testimony submitted by a protestant in Part 2 that incorporates your findings and makes a tie-in to any of the hearings issues for Part 2?

MR. O'LAUGHLIN: I'm going to object. Part 2 is not completed yet, so we don't know how this testimony will or will not be used. There's still --

CO-HEARING OFFICER DODUC: Mr. O'Laughlin, Mr. O'Laughlin, I believe Ms. Ansley is referring to testimony that has already been submitted.

MR. O'LAUGHLIN: Oh, if it's in regards to testimony that's been submitted to date I have no objection, withdrawn.

CO-HEARING OFFICER DODUC: I'm sure Dr. Paulsen has reviewed all the testimony that has been submitted to date.

WITNESS PAULSEN: I have not reviewed all the testimony that has been submitted to date, so I don't know.

MS. ANSLEY: Thank you.

WITNESS PAULSEN: I would be surprised, though. My understanding is that all the testimony that was submitted to date was submitted on or around

the same day for the same deadline. So I don't know how any of the other experts would have used this information. We did not provide it prior to the deadline to anybody else.

MS. ANSLEY: Well, that's how they would find out about it is a lot of times parties obviously join together in groups.

So you are not -- you not work with any other protestant who submitted testimony on -- in November of 2017 that utilizes your findings to make a tie-in in their case in chief to hearing -- Part 2 hearing issues?

WITNESS PAULSEN: I'm not aware of this information being shared with any other expert prior to the submittal deadline for the Part 2 case in chief testimony. Sorry.

CO-HEARING OFFICER DODUC: Mr. Jackson.

MR. JACKSON: Yes, just a point of clarification. We are going to have rebuttal, right, in Part 2?

CO-HEARING OFFICER DODUC: We've sort of been through this already, Ms. Ansley. And I don't remember now whose testimony it was that you objected to.

MR. JACKSON: Mr. Burke.

MS. ANSLEY: That was Mr. Burke.

CO-HEARING OFFICER DODUC: Yes, that we overruled you on. So this line of inquiry, if you're moving towards excluding or objection to Dr. Paulsen's testimony, the same ruling would apply.

MS. ANSLEY: I have no further questions for Dr. Paulsen.

CO-HEARING OFFICER DODUC: Thank you.

Mr. Herrick and then Mr. Jackson.

CROSS-EXAMINATION BY MR. HERRICK

MR. HERRICK: Thank you, Board members, Chair. John Herrick for South Delta parties. I have a few questions for Mr. Steiner with regard to his modeling results. And then I have a few questions for Dr. Paulsen with regards to the results of her analysis including the errata sheets on the bar charts.

So starting with Mr. Steiner.

Mr. Steiner, you identify a couple of issues with the modeling presented for the WaterFix; is that correct?

WITNESS STEINER: I don't know if they're issues, but observances, yes.

MR. HERRICK: And one of those deals with the fact that the incorporation of climate change, I'll say assumptions the modeling changes the various -- changes some of the year types categorization under

different -- as hydrological year types.

That was very poorly put.

MR. O'LAUGHLIN: We agree.

WITNESS STEINER: Correct, Mr. Herrick. We know the distribution, the ranking, and the occurrence of the historical database as far as the CalSim modeling from 1922 to 2003. We know the frequency and occurrence of year types for today's hydrology as we assume it creates a -- under the 60-20-20 formula for the San Joaquin index, it changes -- changes in distribution occurs of year types, assuming climate change.

MR. HERRICK: And in this instance, with the climate change assumptions in the modeling used for the WaterFix, is it correct to say that the -- the modeling then shows drier year types and thus less need for additional water to meet flow requirements at Vernalis?

WITNESS STEINER: It indicates lower year types but -- which would then require -- which would then designate a lower flow requirement. How that trickles back into the system, whether it's there or not or it has to make specific actions to meet that is a different question.

Whether it would require additional releases, more or less releases, that's a matter of we have to

look at the study. Intuitively, yes, if the requirement is less, then there should be less actions upstream from their otherwise operation for specific additional releases. But again, that hydrology trickles to the upstream operations, too.

MR. HERRICK: And those changes in upstream operations, including releases from New Melones, are dependant then in the modeling upon which climate scenario one would choose; is that not correct?

WITNESS STEINER: Yes, it would.

MR. HERRICK: Do you know the basis for the climate change scenarios chosen for the WaterFix scenario?

WITNESS STEINER: As far as I know, specific, because I've had many briefings on the subject, but it is what they called the ELT, early long-term climate change scenario. I can't get very much specific about what it entails.

MR. HERRICK: Another issue you raised with respect to the modeling is that the modeling does not show compliance with the Vernalis standards for fishery flows; is that correct?

WITNESS STEINER: During the pulse flow period.

MR. HERRICK: And I just want to make this

clear. Is it your testimony that the modeling done under the WaterFix, it doesn't address the pulse flow at Vernalis for fish and wildlife protection; is that correct?

WITNESS STEINER: Yes, under the -- in No Action Alternative or the Alternatives, it does not -- operations of the San Joaquin are not made to satisfy the D1641 pulse flow requirements at Vernalis.

MR. HERRICK: And as you just said in your answer, though, that pulse flow is a requirement in D1641 and placed on the -- placed on DWR and USBR via their permits, correct?

WITNESS STEINER: I'm not going to -- I can't --

MR. O'LAUGHLIN: Objection, compound. DWR and USBR? You might want to break it up.

MR. HERRICK: I don't want to get into any footnotes, so I won't break it up.

WITNESS STEINER: I do not want to make a legal opinion on whether the compliance with the pulse flow requirements are a duty of the state and federal water projects at this point, in the context of the development during the vamp period and all that and how all those responsibilities were assigned.

I did not know the status of the legal

requirement upon the projects to meet the pulse flow requirement.

MR. HERRICK: That's fine. I don't mean to test you legally. But you were part of the hearing that lead to the D1641 decision, correct?

WITNESS STEINER: Correct.

MR. HERRICK: And that decision was a water right decision, correct?

WITNESS STEINER: Correct.

MR. HERRICK: And to your knowledge, that implemented, through various permits, the requirement of the 1995 Water Quality Control Plan, correct?

WITNESS STEINER: Correct.

MR. HERRICK: I'll leave it at that.

If we could go to your Table 4, I think it is, in SJTA-303. And I won't make any comments on the ability of humans to read Tables 2 and 3.

And Mr. Steiner, I just want to make sure we all understand. Your numbers on Table 4 indicate the deficits needed to meet various flows from the time frame February through June under D1641 requirements, correct?

WITNESS STEINER: That is correct.

MR. HERRICK: And we have some significant numbers in there, do we not?

WITNESS STEINER: They are very significant.

MR. HERRICK: And by -- I use the word "significant" in that the additional flow needed to meet the pulse flow, say, is sometimes 10,000 acre-feet or 100,000 acre-feet; it varies quite significantly, does it not?

WITNESS STEINER: That is correct.

MR. HERRICK: So any of these numbers could have an effect on carryover storage, especially New Melones?

WITNESS STEINER: Melones or other streams in the San Joaquin Basin.

MR. HERRICK: And without knowing where the water might come from under what circumstances to meet any of these deficits, do we know the effects of operation under WaterFix?

WITNESS STEINER: I don't know if I'd link these deficits to implementation of the California WaterFix. This would be -- these are deficits to D1641.

MR. HERRICK: You've mentioned that San Joaquin River flow sometimes is a factor in determining how much exports occur; is that not correct?

WITNESS STEINER: That is correct.

MR. HERRICK: And in this proceeding, we're looking at things such as exports and outflows and reservoir operations under California WaterFix, correct?

WITNESS STEINER: Correct.

MR. HERRICK: And if we have a deficit to meet the San Joaquin River fishery flows, as the ones you've indicated may be, would that not then be something unexamined in the WaterFix hearing as to what's going to happen when to whom?

WITNESS STEINER: It could potentially result in a difference in results in the evaluation of the California WaterFix.

MR. HERRICK: That's all. If I may move to Dr. Paulsen, please. And this won't take long.

Dr. Paulsen, the first question is does your analysis include the operation of the tidal or ag barriers in the South Delta?

WITNESS PAULSEN: We included them to the same extent that DWR did.

MR. HERRICK: I just want to almost clarify that. If we could go to your testimony, and it's SJTA-304 -- or is it 304 Errata?

MR. O'LAUGHLIN: 304 Errata.

MR. HERRICK: 304 Errata. And I have

Figure 1A. I think that's on Page 6. Yes.

Dr. Paulsen, you discussed how the flow of approximately 3,000 cfs beginning in February in Table 1A related to your analysis. Do you remember that?

WITNESS PAULSEN: These aren't in cfs; these are thousand acre-feet.

MR. HERRICK: That's correct, thousand acre-feet.

WITNESS PAULSEN: Yes. I remember talking about this.

MR. HERRICK: And that's the question I wanted to ask you. In February, when we have a 3,000 acre-foot amount, that would translate into 1500 cfs in any particular day, correct? So if it's 3,000 acre-feet on a day, it would be 1500 cfs at Vernalis approximately?

WITNESS PAULSEN: I don't remember the exact conversion. I think that's about right.

MR. HERRICK: And the only reason I make that point is, as we go through the year in, say, Figure 1A and we get down to June, July, the thousands of acre-feet have now dropped to approximately, say, 1200 acre-feet over there in June; is that correct?

WITNESS PAULSEN: Yes.

MR. HERRICK: And assuming that cfs times two per day equals acre-feet, then a 1200 acre-feet 1,000 acre-feet would be about 600 acre-feet at Vernalis, correct?

WITNESS PAULSEN: Yes. I wish I could check the conversion, but your math is right.

MR. HERRICK: That's great. Hypothetically, it's 2 point -- or 1.98 times -- anyway, strike that.

If we could turn to Page 9, please. And I'm looking at Table 1.

Dr. Paulsen, you covered Table 1 in your presentation, and you went through the totals of CVP and SWP exports under the various columns and lines there. Do you recall that?

WITNESS PAULSEN: Yes.

MR. HERRICK: And of course these are just a limited number of years because you were using the 16-year time frame that the WaterFix proponents used, correct?

WITNESS PAULSEN: Right. These are three of the 16 years in their simulation period.

MR. HERRICK: So without drawing any long-term or too broad of conclusions, is it correct to say that the projects are apparently diverting more water in a dry year from the South Delta pumps than they are in a

below normal year or in these instances anyway?

WITNESS PAULSEN: Yes. This is -- these are percent, so they're diverting a higher percentage of the February-to-June San Joaquin River inflow in the dry years than they are in the critical or below normal years here. And that is true for both the existing condition and for Scenario H4.

MR. HERRICK: So according to these year examples anyway?

WITNESS PAULSEN: Yes.

MR. HERRICK: There's less chance in a drier year of San Joaquin River water -- a percentage of San Joaquin River water reaching the Bay than in a below normal year; is that correct?

WITNESS PAULSEN: There is less San Joaquin River water that flows in between, in the February-to-June time frame, that makes it out as Delta outflow in the dry year than there is in the below normal year, if that's your question.

MR. HERRICK: Yes.

WITNESS PAULSEN: Okay.

MR. HERRICK: And then if we could go to your Figure 6A and on -- I think it's Page 13 still. If we could go to the second one, 6B, which is dry years, dry year type.

Now, Dr. Paulsen, would you agree that, looking at this chart, it does not appear that the North Delta diversion or diversions are being used to take a big gulp during wet times?

WITNESS PAULSEN: Well, these are the average results for all the dry years that are in the 16-year simulation period. And I -- you know, I think the numbers sort of show for themselves.

In this year type, in the wet months maybe a little of November but traditionally December, January, February, March, there is more water that's exported from the South Delta export locations than from the North Delta diversion locations.

MR. HERRICK: Are you familiar with the term "big gulp" that's been used both during the BDCP and the WaterFix analysis time frame?

WITNESS PAULSEN: I'm generally familiar with that term, yes.

MR. HERRICK: And the way I read this Figure 6B, the North Delta diversions are taking more water in March, April, May, and June than they are in November, December, and January. Would that be a correct reading of this?

WITNESS PAULSEN: The total amount of water in -- I'm sorry. Could you say the months again?

MR. HERRICK: Would you agree that, according to this Figure 6B, that the North Delta diversions are taking more water in the months of April, May, June, and July than they are in November, December, and January?

WITNESS PAULSEN: I'd to have look at the exact numbers. I'm not sure about the November part, but I think for the other months that appears to be true based on the size of the bars.

MR. HERRICK: And if we look at July, there are two bars there. The first bar, per your testimony is the total exports and the second bar -- under the No Action, and the second bar are the exports under H4 scenario; is that correct?

WITNESS PAULSEN: Yes, but not the No Action; under the EBC2 existing condition.

MR. HERRICK: Yes, thank you. It's your EBC2.

WITNESS PAULSEN: Right -- it's DWR's EBC2; it's not mine.

MR. HERRICK: Sorry, yes.

In July, then, we see that, rather than having a -- what is that, just below 12,000 cfs diversion at the South Delta pumps, we've now got, I don't know, say a 3200 diversion in the South Delta and then 3,000 maybe from the north Delta; is that correct?

WITNESS PAULSEN: Yes. That appears to be roughly the right numbers.

MR. HERRICK: So if you decrease the diversions from the South Delta from approximately 12,000 to approximately, you know, 3500 or something and take more -- take water from the North Delta diversion, does that affect water quality in the Delta?

WITNESS PAULSEN: Yes. Water quality is a function of the source of the water that's there. So as you're changing the distribution of the sources of water in the Delta, you will also change water quality.

MR. HERRICK: And that's a sig- -- the July on this figure is a significant change, is it not?

WITNESS PAULSEN: These numbers are pretty different in terms of the amounts of water that's exported in the dry year type on average in the month of July, yes.

MR. HERRICK: In a dry year in July, would you expect there to be very much inflow to the Delta from the San Joaquin River?

WITNESS PAULSEN: In -- well, I'm sorry. I'm not sure I understand the question

MR. HERRICK: In July of a dry year, would you expect the inflow to the Delta from the San Joaquin River to be relatively small as compared to the

Sacramento River?

WITNESS PAULSEN: Yes.

MR. HERRICK: And generally speaking, the San Joaquin River is worse quality with regards to salt, salinity.

WITNESS PAULSEN: Yes, that's true.

MR. HERRICK: So according to this figure, under July, under the EBC2 scenario, significant exports from the South Delta would bring significant amounts of Sacramento River water into the South Delta, correct?

WITNESS PAULSEN: Yes, that's generally true.

MR. HERRICK: And under the H4 scenario under same month, much -- or say one third as much Sacramento River water is being brought into the South Delta; is that correct?

WITNESS PAULSEN: I don't know the exact quantities. We'd have to look at that. But in general, yes, I would expect the distribution of water in the Delta to be changed.

And I think we looked at that quantitatively as part of the Part 1 testimony that we did for some other parties and saw some of these general trends, I think, that you're describing.

MR. HERRICK: And lastly, when have

percentages of San Joaquin River water reaching the Bay of -- I think you had 0.1 percent and sometimes 5 percent, when that little bit of San Joaquin River water is reaching the Bay, it's not a separate section of the stream; it's just dispersed molecules that happened to go out to the Bay; isn't that correct?

WITNESS PAULSEN: Right. There's -- right. The 0.1 percent, that fraction of water would be mixed with water from other sources and flow together toward the Bay.

MR. HERRICK: And, yeah, I was just inartfully trying to say that there's no San Joaquin River push of water into the Bay, is there? It's just some of their molecules, through happenstance, end up in the Bay, correct?

WITNESS PAULSEN: I'm not sure I agree with the "per happenstance," but the water -- water from the various water sources mixes in the interior of the Delta and sloshes around with the tides and takes some time to mix and to work its way out to the Bay.

So that San Joaquin River water that makes it out to the Bay is mixed with water from other sources when it makes it there. Does that answer your question?

MR. HERRICK: Yes. And if it's 0.1 percent in

that instance you gave, that means that the rest of the water that's going out to the Bay, 99.99 percent is from some other source; is that correct?

WITNESS PAULSEN: Sort of. But just to be clear, the 0.1 percent means that 0.1 percent of the San Joaquin River water that flowed in in the February-to-June time period makes it out. The rest of it is either exported or consumed within the Delta.

MR. HERRICK: Yes, I said that incorrectly.

WITNESS PAULSEN: So the fractions might be different in what's leaving, but 0.1 percent of the water that flows in in that time period makes it out as outflow.

MR. HERRICK: Thank you very much. I have no further questions.

CO-HEARING OFFICER DODUC: Thank you, Mr. Herrick.

Mr. Jackson.

CROSS-EXAMINATION BY MR. JACKSON

MR. JACKSON: Mr. Hunt, could you leave up the PowerPoint 305, I believe. And could you go to Table 1 on Page 9.

Dr. Paulsen, you indicate that the other water sources that are in green, I believe, on your -- or the darker color on your table in Scenario EBC2, is it fair

to say that they provide more of the water that's exported from the Delta than the San Joaquin River does?

WITNESS PAULSEN: Yeah, I think that these bars show that the fraction of San Joaquin River water is -- I think it's less than half for all of the bars as compared to the total amount of water that's exported. And this is from the CVP.

MR. JACKSON: And this is from the CVP. And the CVP is at the southern end of the Delta, correct?

WITNESS PAULSEN: Yes.

MR. JACKSON: When the other water sources, insofar as the Sacramento River, are moved through the tunnel system, the North Delta diversions, is there a contribution from other water sources, or is the San Joaquin River basically the only thing that's in the Delta?

MR. O'LAUGHLIN: I'm sorry. Vague and ambiguous, and that question made no sense. No offense.

CO-HEARING OFFICER DODUC: I was going to be more polite than that, Mr. O'Laughlin.

I didn't quite understand, Mr. Jackson.

MR. JACKSON: Yes. When the means of delivery of the other water source becomes tunnel water instead

of water through the Delta, would you expect that the water quality would change?

CO-HEARING OFFICER DODUC: Ms. Ansley.

MS. ANSLEY: I'm going to object that this is vague and ambiguous given that we're looking at the graph. The green bars in this graph, this is under the existing EBC2; it's not water through the North Delta diversion. So that renders the question a little bit vague and ambiguous in context.

CO-HEARING OFFICER DODUC: Sustained.

MR. JACKSON: All right. Could I see the next graph.

Scenario H4 on this graph shows that there is less other water sources exported than there was in the previous graph; is that correct?

WITNESS PAULSEN: I think so. Looking at this graph, there's less water exported by the CVP in these year types for Scenario H4 than there was in the prior graph, which showed the comparable results for the existing condition EBC2.

MR. JACKSON: Would that have an effect on water quality in the South Delta?

WITNESS PAULSEN: Yes, and that's something that we looked at also in Part 1. When you use the North Delta diversions, that water that's exported at

those locations is entirely Sacramento River water. And so the other water sources shown on these graphs, the green portion of the bar is probably primarily Sacramento River water plus water from a handful of other sources, the east side streams, agricultural return flows and the like.

If you take more Sacramento River water out of the system, because you're diverting from the North Delta diversion locations, there will be less Sacramento River water in general that flows into the central part of the Delta. So that composition of water inside the Delta changes, and the quality of that water changes.

MR. JACKSON: And there's a substantial difference in the quality of the water from the two sources, the San Joaquin River and the Sacramento River?

CO-HEARING OFFICER DODUC: Hold on.

Ms. Ansley.

MS. ANSLEY: I'm going to say that that's vague and ambiguous. As to quality, there's a lot of parameters that have been analyzed in the FEIR and a lot of parameters that have been also analyzed by Dr. Paulsen. So just saying water quality itself is overbroad and vague and ambiguous.

CO-HEARING OFFICER DODUC: Is there any particular water quality parameters you're interested in, Mr. Jackson?

MR. JACKSON: Electrical conductivity.

WITNESS PAULSEN: Electrical conductivity, salinity, TDS -- all sort of equivalent. The units or the exact levels will vary. But in general, when I've thought about water quality, you know, for example, for a good portion of the testimony that was presented in Part 1, I was thinking about salinity -- other things, but salinity. And certainly the Sacramento River water -- Sacramento River generally has lower salinity than the San Joaquin River or agricultural return flows, for example.

MR. JACKSON: And the agricultural return flows are in general coming in through the -- through the San Joaquin River system?

WITNESS PAULSEN: There are also agricultural return flows that come into the Delta channels from the interior of the Delta and that are included in the DSM-2 simulations.

MR. JACKSON: So both of those would be happening at the same time without the dilution water from the Sacramento River? The same amount of dilution water?

WITNESS PAULSEN: Certainly the Sacramento inflow -- excuse me, the San Joaquin River inflows continue; the agricultural returns at the interior Delta nodes continue.

But, again, when you're diverting more water from -- when you're diverting water from the North Delta diversion locations, that's all Sacramento River water. So in general, means that there will be less Sacramento River water in the interior system to blend with the water from those other sources.

MR. JACKSON: Can we move to the PowerPoint -- let's see. In your 304 Errata, it's Figure 6C. Yes. Thank you.

WITNESS PAULSEN: Yes, that is 6C.

MR. JACKSON: I'll start with 6A, excuse me. So would you scroll up?

In general, there will be a -- according to this graph, there will be a higher percentage of South -- of water diverted at Banks and Jones in August and September; is that correct, if we move to the WaterFix?

WITNESS PAULSEN: This doesn't show percent, but it shows that the amount of water exported under existing conditions in August and September -- of course, for the existing conditions EBC2, it's all

exported from Jones and Banks. And that is greater than the total amount of water exported in August and September for the H4 scenario.

MR. JACKSON: Will there also be a decrease in water for the H4 scenario coming from the Sacramento River in those months?

WITNESS PAULSEN: A decrease in the volume of Sacramento River water that's exported?

MR. JACKSON: Yes.

WITNESS PAULSEN: Honestly, I don't know because this graph doesn't show that explicitly. We could look at other information to probably try to figure that out, but this -- I can't from this --

MR. JACKSON: Right, from this graph you can't tell. But it's clear from this graph that the water pumped will be mostly from the San Joaquin side?

WITNESS PAULSEN: For the --

MR. JACKSON: For August and September.

WITNESS PAULSEN: For Scenario H4?

MR. JACKSON: Yes.

WITNESS PAULSEN: I'm sorry. Could you repeat the question? I've lost the thread of that one.

MR. JACKSON: Sure. In a critical water year, for August and September, most of the -- this shows that most of the water will be pumped as Banks,

correct?

WITNESS PAULSEN: For Scenario H4 at Jones and Banks, yes.

MR. JACKSON: Jones and Banks. Would you expect that the pumping from Jones and Banks would be from Sacramento River water or San Joaquin River water during those months, or can we tell from your work?

WITNESS PAULSEN: We can't tell the exact proportions from this graph. It's certainly possible to figure that out, but this graph doesn't show it.

MR. JACKSON: Okay. How would you figure that out? What process would you use?

WITNESS PAULSEN: We would look at the source fingerprints. So what's a little bit different with some of the work that we've shown here is that we have tagged the San Joaquin River inflows in the February-to-June time period.

If we wanted to figure out where all of the water exported at these locations comes from, we would tag San Joaquin River water throughout the whole year, and we would tag the other source as well. And then we could figure out where the water at that export locations originated from as a function of time. So this graph doesn't show that, but we could do that.

MR. JACKSON: Did you see that done by the

work you reviewed by DWR?

WITNESS PAULSEN: DWR did perform some fingerprinting runs. They -- well, EBC2, the existing condition scenario that we're showing here, I don't believe is -- other than we've put it in here in evidence in this proceeding, I don't believe DWR evaluated the EBC2 existing condition run as part of their WaterFix petition here.

They did present some fingerprinting results for a number of the other scenarios, the No Action and some of the project scenarios. I don't remember exactly the various permutations that they presented. But they did conduct some fingerprinting runs.

MR. JACKSON: Mr. Hunt, could you put up Table 1 on Page 9.

Table 1 shows a 1979 below normal year, which I think you highlighted in your direct testimony as the only year in the data prepared by DWR that was below normal; is that correct?

WITNESS PAULSEN: For the DSM-2 runs that spanned the 16-year time frame, that's right. There was only one below normal year in that 16-year period.

MR. JACKSON: Isn't there an 82-year time period?

WITNESS PAULSEN: I believe that they ran

CalSim for an 82-year period. But I don't think that they've presented DSM-2 model results for that 82-year period. It's possible to perform that simulation, but I don't think they have.

MR. JACKSON: And do you know why they shortened the time period?

WITNESS PAULSEN: I don't.

MR. JACKSON: Have you run the 82-year time period?

WITNESS PAULSEN: No. Just to be clear on that last answer, we have done DSM-2 model runs for an 82-year period generally before but not for the WaterFix runs.

MR. JACKSON: Okay. I think Mr. Herrick covered the rest of what I had. Thank you.

CO-HEARING OFFICER DODUC: Thank you, Mr. Jackson.

Any redirect?

MR. O'LAUGHLIN: No.

CO-HEARING OFFICER DODUC: And does that conclude your case in chief?

MR. O'LAUGHLIN: Yes.

CO-HEARING OFFICER DODUC: At this time, would you like to move your exhibits into the record?

MR. O'LAUGHLIN: Yes.

CO-HEARING OFFICER DODUC: Any objections.

(No response)

CO-HEARING OFFICER DODUC: You may not say no, Mr. O'Laughlin.

All right. Not seeing any objections, they are so moved.

(San Joaquin Tributaries Authority Exhibits 301 through 307 admitted into evidence)

CO-HEARING OFFICER DODUC: Thank you, Dr. Pauslen and Mr. Steiner.

WITNESS STEINER: Thank you.

CO-HEARING OFFICER DODUC: And I will now ask Dr. Paulsen to stay. And I believe, Mr. Emrick, you're up.

Do you wish to take a break?

MR. EMRICK: That's fine. I have no objection to that.

CO-HEARING OFFICER DODUC: I'm not asking you. I'm asking the most important person here.

Why don't we take a short break. Okay. Actually, why don't we take a break until 11:50.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. Please take a seat. It's 11:50. We'll be doing a little bit

of time checking before we turn to Mr. Emrick.

Mr. Emrick -- actually, I'm talking to you. How much time do you anticipate needing for direct?

MR. EMRICK: Approximately 15 minutes, maybe 20.

CO-HEARING OFFICER DODUC: And then estimate for cross, Ms. Ansley?

MS. ANSLEY: I will say -- Jolie-Anne Ansley Department of Water Resources. I'll say 20 to 30 minutes, please.

CO-HEARING OFFICER DODUC: Okay.

MR. HERRICK: John Herrick, South Delta parties. Maybe 10 minutes at most.

CO-HEARING OFFICER DODUC: That should take us to about 12:50 in time for our later lunch break.

And then when we return, do we have City of Stockton here? How much time do you anticipate for direct?

MR. HERRICK: I think their attorney and stepped out.

CO-HEARING OFFICER DODUC: I'm sorry. I need you to come up to the microphone, please.

DR. LYTLE: I would estimate 10 the 15, minutes.

CO-HEARING OFFICER DODUC: Okay. And estimate

for cross?

Oh, I'm sorry. Did you have something to add?

MR. GRANBERG: I would have about the same, 10 to 15 minutes.

CO-HEARING OFFICER DODUC: Okay. I'm confused. Who are you?

MS. ANSLEY: I think those are the two witnesses. So together they would be 20 to 30 minutes of direct.

CO-HEARING OFFICER DODUC: Thank you. I was confused. All right.

This is what happens when you leave your witnesses alone, Mr. Simmons.

MR. SIMMONS: What did my clients say?

CO-HEARING OFFICER DODUC: Your time estimate for direct?

MR. SIMMONS: Under 20.

CO-HEARING OFFICER DODUC: And we will most likely get to you after lunch, the way it looks like.

And then cross for Stockton?

MS. ANSLEY: Cross for Stockton will be no more than 20 minutes, 15 to 20. And we only have questions for Mr. Granberg.

CO-HEARING OFFICER DODUC: Okay.

MR. HERRICK: John Herrick, South Delta

parties. At most, 10 to 15 minutes.

CO-HEARING OFFICER DODUC: So we will definitely get to Contra Costa today then.

Time estimate for direct for Contra Costa?

MR. KELLER: Curtis Keller for Contra Costa County, 40 minutes.

CO-HEARING OFFICER DODUC: And cross?

MS. ANSLEY: 15 to 20, maybe a tiny bit longer.

MR. HERRICK: John Herrick, South Delta parties. At least 30 minutes.

MR. JACKSON: Michael Jackson, at least 30 minutes.

CO-HEARING OFFICER DODUC: All right. That looks to be a very full afternoon.

Ms. Ansley.

MS. ANSLEY: This is just a minor housekeeping. I do have an objection to Dr. Paulsen's Antioch testimony. I'm happy to do it now, or when I sit down to do cross.

CO-HEARING OFFICER DODUC: Let's wait until you sit down.

All right. At this time, with my estimate, I don't believe we'll get to County of Yolo -- I'm sorry, Sacramento County's remaining witness.

How much time, Mr. Whomever -- is it -- are they even here? They're not even here. That's a good thing.

Reza Moghissi? All right.

MR. SIMMONS: We'll find out for you, Chair.

CO-HEARING OFFICER DODUC: Thank you. Okay.

At this time, then, I will turn it back to Mr. Emrick. But it looks like we have a rough outline for the rest of the day, and it is pretty packed.

DIRECT EXAMINATION BY MR. EMRICK

MR. EMRICK: Thank you, Board.

Matthew Emrick, City of Antioch. And today we have Dr. Susan Paulsen presenting our case in chief. I believe Dr. Paulsen has been sworn, and her qualifications have previously been put in as an exhibit.

I will have Dr. Paulsen, however state her name for the record.

SUSAN PAULSEN,

called by Protestant Group 27 as a Panel 1 witness, having been previously duly sworn, was examined and testified as hereinafter set forth:

WITNESS PAULSEN: My name is Susan Paulsen, P-A-U-L-S-E-N.

MR. EMRICK: And for purposes of today's direct testimony, Antioch 500 Errata, that is a copy of your written testimony; is that correct?

WITNESS PAULSEN: Yes.

MR. EMRICK: And Exhibit -- Antioch Exhibit 501, that's a copy of supplemental figures regarding water usability at Antioch's intake; is that correct?

WITNESS PAULSEN: Yes.

MR. EMRICK: And then Exhibit 502 is a PowerPoint presentation summarizing your direct testimony for today; is that correct?

WITNESS PAULSEN: Yes, it is.

MR. EMRICK: Why don't I go ahead and ask Mr. Hunt to put up Antioch 502, and then I'll turn it over to you, Dr. Paulsen.

WITNESS PAULSEN: Thank you.

Could we move to the next slide, please?

All right.

CO-HEARING OFFICER DODUC: I'm sorry. Before you do that, Dr. Paulsen, I apologize to Mr. Emrick, you actually submitted an opening statement, a written opening statement.

Did you want time to provide any oral opening statement?

MR. EMRICK: No.

CO-HEARING OFFICER DODUC: Thank you. All right. We'll turn back to Dr. Paulsen.

MR. EMRICK: Thank you.

WITNESS PAULSEN: Okay. Thank you.

For this Part 2 testimony, we've developed four opinions that are summarized here. I won't read through them. We can I guess read through them as we go through the detail. They focus primarily on the natural water quality condition at Antioch's intake and evaluating the WaterFix operational scenarios through that lens and then a couple of thoughts about proposed flow criteria.

Next slide, please.

The first opinion has to do with the historical water quality condition in the vicinity of Antioch's intake. And we are providing this opinion for three primary reasons.

First, it has been stated that third party water right holders are only entitled to the natural flows necessary to provide adequate water quality for their purposes of use. They are not entitled to better water quality than would exist under natural conditions. And so that triggers a thought of what is the natural condition and what does that mean in this

context.

The second one is to correct the impression that may have been left by others that the salinity conditions that existed in the 1920s and the 1930s are the natural condition. They are not, they are saltier than the natural condition.

And the third part is because, although I don't offer any opinions about biota, I know that salinity conditions are believed to be an important indicator of what native species evolved to or were exposed to and may require. So we provide this information the spirit of being helpful in the development of flow criteria to establish what salinity conditions looked like in a natural condition and then for some of the different project scenarios.

As shown on this slide, we are lucky. Antioch has been at its location in the Western Delta since probably about 1850 and has used water at its intake location for municipal and industrial purposes since at least 1868. There was a large amount of information available on what water quality looked like over that early time period when Antioch was using water at that intake. So I've got just a couple of quotes, and I'll go through this quickly.

Also, a lot of this information was previously

presented to the State Water Board in the 2010 Flow Criteria proceedings and has been presented as exhibits for this proceeding as well. So that information is there if we want to go back to it.

This quote is from the Department of Public Works, which is the predecessor agency to DWR. And in 1931, they wrote a report evaluating the cause of salinity intrusion into the Western Delta.

And just to read this into the record, it says, "From early days, Antioch has obtain all or most of its domestic and municipal water supply from the San Joaquin river immediately offshore from the city. However, conditions were fairly satisfactory in this respect until 1917, when the increased degree and duration of saline invasion began to result in the water becoming too brackish for domestic use during considerable periods in the summer and fall."

The next slide -- also contains a quote. The top bullet is a quote from a report written by Thomas Means in 1928. It is noted that salinity intrusion began to increase markedly in about 1918, when -- and here's the quote, "The urge of war had encouraged heavy plantings of rice and other crops in the Sacramento Valley resulting in the penetration of salt water into the Delta for a longer time and to a greater distance

upstream than ever known before."

Again, I won't go through the entire record, but there is additional information that demonstrates that natural conditions at Antioch prior to about 1917 or 1918 were predominantly fresh and that water at the city's intake was available for diversion year round, at least during low tide, in all but the very driest of years.

Next slide, please.

On the right is a graph that we produced as part of the 2010 Flow Criteria proceedings. And I'd like to just walk through how this was generated because I would like to present similar information for the WaterFix scenarios or -- the information for the WaterFix scenarios in a similar format.

The graph on the right uses measured data at Antioch's intake for the time period of 1985 to 2009 so a 25-year period. And the way the graph was generated was to take the salinity values -- it's a seven-day running average at low tide -- to take those values on each day and to order them over that 25-year period and then to calculate the summary statistics on those ordered values.

So for October 1st, there are 25 values, one for each year in the 25-year period. And if you order

them, you can then pick off the 10 percent, 25 percent, 50 percent, et cetera, values.

That's what's shown in the squiggly lines on the top part of the graph. So the driest 10 percent of values are shown in the red line at the top, and the wettest 10 percent of values are shown in the greenish line at the bottom.

The horizontal blue line corresponds to a salinity level of about 1,000 EC, which is about 250 milligrams per liter chloride. What we've done then is to generate bars along the bottom. There are two panels shown on the bottom. The top panel corresponds to the graph on the top.

And for that red bar, the driest 10 percent, you can see that it is below that salinity threshold for about a month or a month and a half, and the red bar in the bottom panel corresponds to that month or month and a half. So we've got the driest 10 percent of values showing up as the red bar. The driest 25 percent of values showing up as the orange-ish bar, et cetera.

And so this provides a visual measure along the bottom of just how frequently, under those various percentile conditions, water is of a salinity that is suitable for use.

The bottom bars are the historical pre-1918 bars. And we compiled those using information in the historical record such as what I just showed you as well as some additional information.

So what you can see just comparing these two sets of bars is that water was available year round except in the driest of years, which is consistent with the historical record, prior to about 1918.

But when we get to the 1985 to 2009 time frame, you can see that, for those different percentile values, water is not available year round except in the wettest 10 percent of conditions. So those bars represent when water is useable. And you can see it's already useable a lot less frequently in the historical record for that 25-year period than it was prior to about 1918.

Now, what we did was to generate bars like this for the WaterFix model -- WaterFix scenario model runs. And we made one additional adjustment. As detailed on the left-hand side, for the historical period of 1906 to 2016, about 14 percent of water years were critical. But for the 16-year model period, that's DWR simulation period, about 31 percent of the water years were critical.

So it wouldn't be fair to take the bottom bars

without adjusting those. We did in fact reduce the years of availability in light of the different mix of year types.

All right. So the next slide, what we did was to use the model runs to look at two different quantities. One was the seven-day running average of the salinity at low tide, which is analogous to what we did in the 2010 Flow Criteria proceedings. And the second was to look at the peak daily salinity, which occurs about two hours after higher high tide. And that's the definition -- the time when water is evaluated for its usability per the 1968 agreement between the State and the City of Antioch.

We then ordered the values for that 16-year period and again calculated the exceedance probabilities for that 16-year period.

So the next slide shows the graphical representation of the low tide salinity comparison. These numbers were calculated again from the DWR simulations, the DSM-2 simulations for the 16-year period using that same methodology.

So we've got the driest 10 percent is the red, the wettest is the green, and then the other percentiles in between. And then we generated bars that correspond to the time periods when the salinity

is less than that usability threshold, 250 milligrams per liters chloride.

What you see on the left is the Boundary 1 scenario. So you can see that water is not available year round in any of those year types. Of course, in the wettest 10 percent of years, water is more available than it is in the driest 10 percent of years. So that's sort of a way, on the bars on the bottom, ov visualizing when water is available for use at low tide.

On the right-hand side is the same thing for Boundary 2. And Boundary 2 has more outflow. Water is more available than it is under Boundary 1. We did the same thing for all of the other scenarios that we evaluated, which is part of the Part 1 of this proceeding.

And if you look at the next slide, what you've got is the adjusted historical on the top, again, adjusted for the fact that there are more critical years in this 16-year time period than in the historical record. And then similar bars for Boundary 2, which is the wettest of the WaterFix scenarios for EBC2, for the NAA, for the H4, the H3, and the Boundary 1. So those are roughly ordered from wetter at the top for Boundary 2 to drier at the bottom

for Boundary 1.

So this provides a graphical representation, again, of when water is available at low tide at the City's intake below that 250-milligram-per-liter chloride threshold. And then that information is tabulated on the left. And I won't read through those values except to say that clearly all of these scenarios, including the Boundary 2 scenario, represent higher salinity at Antioch's intake than would have occurred under the natural condition.

The next slide shows the same thing for higher high tide plus two hours on a daily basis. Here, we did not include the natural condition because we don't have the same richness of detail to describe that natural condition in the historical record as we do for the low salinity, low tide condition.

So here, we're looking at the number of days ordered in these percentile exceedance values for the Boundary 2 through the Boundary 1 scenarios, ordered just, again, loosely from the wettest at the top to the driest or at least outflow at the bottom.

And you can see, for example, that in the driest 25 percent of years for the Boundary 2 scenario, water would be available at Antioch's intake for about two months' worth of time -- sorry. That's the wettest

of scenarios at Boundary 2. Did I say that correctly? And for the driest of scenarios for Boundary 1 in the 25 percent driest condition, water wouldn't be available at all below 250 milligrams per liter at higher high tide plus two hours.

So, again, this is a graphical representation intended to provide some information on how frequently certain water quality thresholds are met at Antioch's intake in the Western Delta.

All right. The next slide gets into Opinion 3, Which is that Fall 2 is an important component in establishing flow criteria and in determining salinity in the Western Delta. So what we've reproduced here are some figures that we used in Part 1 of the proceeding. And they show the percent of water that arrives at Antioch's intake from the Sacramento River for different year types. And these are, again, aggregated, all the critical years, the dry years, the normal years which are the above and below normal years lumped together, and then the wet years.

The EBC2 existing condition scenario is the blue line that generally appears toward the top part of each of the graphs. The NAA is the pink. And the Boundary 1 scenario is the orange. And Boundary 1 scenario is not operated to Fall X2 and tends to have

less Sacramento River water present at Antioch's intake and higher salinity, as we've demonstrated previously. And based on this and other information, we conclude that X2, Fall X2, is an important determinant of the salinity of water at Antioch's intake.

The next slide.

And I don't think we need to go through all of the values, but it shows the number of days that the 250 milligram per liter chloride threshold is not met at Pumping Plant 1, based on DWR's model results for the NAA, the Boundary 1, Boundary 2, H3, and H4, and we've added the EBC2 scenario.

Obviously the Boundary 1 scenario complies with that 250 milligram per liter D1641 objective less frequently than the other scenarios and represents an increment above the No Action Alternative. So this demonstrates the salinity at Antioch's intake is worsened at least by the Boundary 1 scenario -- and you can see the others as well -- compared to both the existing condition and the No Action Alternative.

The next slide goes to what Antioch proposes as flow criteria in this proceeding. And Antioch believes that, at a minimum, the flow criteria protective of beneficial use and public trust values at Antioch should include requiring the D1641 M and I

water quality objectives to be maintained at Antioch as the 1968 agreement is not protective of those beneficial uses at Antioch.

The 1968 agreement provides that -- provides for a measure of salinity, and it reimburses Antioch in part for water purchases that it must make when the salinity at its own intake is too high as a result of the operation of the State Water Project for water at its intake to be usable.

The agreement applies to chlorides and applies for the municipal and industrial use by the City. Importantly, the agreement does not contain standards or mitigation that are specifically protective of public trust or recreational uses.

The next slide.

As we've previously discussed, the 1968 agreement can be terminated by either the State or the City with 12 months' notice before the WaterFix project will become operational. And so there's the potential for that reimbursement for those water purchases to be lost in the future.

The City therefore requests that either DWR enter into a new agreement or modify the existing agreement in order to mitigate the City for the impacts of the WaterFix project or, if that is not done, that

the State Water Board should require that DWR operate to D1641 at Antioch, not at Pumping Plant 1 but at Antioch, and operate to meet the Fall X2 requirements.

Thank you.

MR. EMRICK: That concludes direct examination by the City of Antioch.

CO-HEARING OFFICER DODUC: Thank you.

Mr. Herrick.

MR. HERRICK: I got an e-mail from Mr. Bezerra that said he just wanted to let you know that he had a few minutes' cross-examination for Contra Costa when they come up. So, I take it "a few minutes" means no more than, like, 15 or 10.

CO-HEARING OFFICER DODUC: "A few minutes" means, like, two.

Ms. Ansley.

MS. ANSLEY: So good morning. My name is Jolie-Anne Ansley for the Department of Water Resources, again.

At this time, I'd like to put on the record a motion to strike Dr. Paulsen's testimony, Antioch-500 Errata. I believe that the Board, in its January 4th ruling, did ask Dr. Paulsen to clarify how her testimony specifically pertained to Part 2 and was not a Part 1 issue.

I have reviewed Dr. Paulsen's Errata, which was actually quite extensive addition of testimony. And I believe that the errata does not solve the original problems of the fact that Dr. Paulsen's testimony, as shown by the permit conditions that they request, largely seeks to mitigate perceived impacts to municipal and industry use by the City of Antioch rather than any sort of passing reference to other public trust values for which these -- this party does not put in any evidence.

So I believe that these are not necessarily flow criteria; these are more in the nature of permit conditions which, under the Hearing Officer's statement of hearing issues, should have been presented in Part 1. And I believe that these can be shown in the -- in the conditions that they actually seek, the No. 1 of which is a new or modified 1968 agreement.

They mentioned expressly that they want to be compensated or mitigated for perceived impacts to the City of Stockton's intake. They asked for a change to D1641 to change the compliance point for Antioch. It's from Pumping Plant 1 to the City of Antioch's intake. And neither of those two conditions have they linked to an impact or protection of fisheries, recreation, or any public trust resource, in particular the 1968

contract or is there any testimony showing that simply a move in the compliance point for D1641 would matter to anything other than what San Joaquin says its impact is on municipal and industrial use.

I believe their Fall X2, which their testimony goes to Boundary 1, which is not the proposed project here today, is -- merely a -- I mean, I think it's merely to the benefit of Antioch's municipal and industrial use. And I don't see any testimony substantiating any information that these suggested permit conditions or, in their parlance, flow criteria -- although, actually, in their own testimony they refer to them as permit conditions -- have anything to do with the issues in Part 2.

So I actually think that the Board's seeking clarification was necessary, and I would like to lodge an objection based on the errata testimony.

CO-HEARING OFFICER DODUC: And in addition to the January 4th ruling that you cited, what other rulings do you recall where we ruled out the possible of receiving proposed permit criteria throughout this entire hearing?

MS. ANSLEY: Well, I don't recall any -- I don't recall any specific rulings, but I note back to the original issues for the hearing in the October 30th

original notice, which I assume had been replicated throughout the hearing and not changed, is that, in Part 1.2.C, the parties were asked what specific conditions, if any, should the State Water Board include in any approval of the petition to avoid injury to legal users of water.

CO-HEARING OFFICER DODUC: So it is your assertion, Ms. Ansley, that the intent was to only receive conditions addressing injury during Part 1?

MS. ANSLEY: No. I think that my contention is that this is really a second bite of the apple, that this party has come forward with impacts to City of Antioch's water uses, municipal and industrial water uses, and they provided testimony in Part 1 of this same thing. We are back hearing -- I think Opinion 1 is actually the exact same testimony, fairly, from Stockton 202.

So I think what we're seeing is a repeat of the same opinions on the same topics with a little bit of extra analysis. So I do believe that what we're doing is rehashing a Part 1 issue with a request for permit conditions to a Part 1 issue. And I think there's a nominal connection here and a superficial connection made to public trust resources that's not even established by any testimony by these parties.

So I think that what I've been trying to articulate with this party but also with a couple other parties is that the words "public trust" or "public interest" can't be just some magic words that lets you circumvent the scope of the hearing and makes it difficult to compartmentalize what we were supposed to present in Part 1 and now what we present in Part 2.

It seems like the real sticking point for us is the articulation of what constitutes a public trust or public interest resource.

Here, reading Dr. Paulsen's testimony, what they're clearly articulating is that their public interest is the legal use of water at the City of Antioch's intake for municipal and industrial use. And so that would be the basis for my objection.

CO-HEARING OFFICER DODUC: Mr. Emrick, your response.

MR. EMRICK: Several responses. I'll try to make them quickly.

First of all, what we were trying to show is what the historical natural flow was, both for public trust purposes. We assume that public trust -- I mean natural outflow also is what, as Dr. Paulsen testified, is what the native fish and wildlife evolved in.

We then went to criteria to show --

understanding that we can never get back to the natural condition -- but to show the Board what might be done to at least restore some of the flow to a condition that existed historically, at least at Antioch.

I believe also that 1641 is used for establishing recreational values, Rec 1, and so certainly recreational uses at Antioch would be part of that.

Antioch didn't have an opportunity to have any testimony with respect to what might be outflow under Part 1, and so that's why we participated and tried to show it in Part 2 here.

And then it goes back to the original hearing where I think it was Mr. O'Laughlin had asked if somebody wants to -- if a party wants to come forward either for Part 1 or for Part 2 and present what they believe should be the outflow, that it would be done here in Part 2. And that's what we've done.

CO-HEARING OFFICER DODUC: Anyone else wants to chime in?

Mr. Herrick.

MR. HERRICK: Yes, thank you. John Herrick for South Delta parties.

In our opinion, just the testimony on natural conditions is relevant to this part and is necessary

for determining all sorts of things, including conditions on the permits -- not anything that Antioch has, but the permits of the petitioners.

I believe we went through this with Mr. Burke, our witness, and the Chair read from the ruling prior that said the testimony can be -- you know, directly applies to the issue, or it could be used by someone else later. It does not have to be tied in at the time it's given to any ultimate issue here.

And there's no doubt the testimony on determining which X2 we're going to have or what the natural conditions were or maintaining water quality at a certain point in the Delta affects other uses, including fish and wildlife and public trust uses.

So I don't see any reason to strike this testimony. I think it's certainly relevant, and I think it applies to this part.

CO-HEARING OFFICER DODUC: Thank you, Mr. Herrick.

Mr. Keeling.

MR. KEELING: Tom Keeling on behalf of the San Joaquin County protestants.

The point of this testimony and the point of Part 2, as I understand it, is to provide the Hearing Officers with information that may be helpful to them

in deciding flow criteria and in deciding whether and under what conditions approval of WaterFix would be in the public interest or counter to the public interest.

Surely the citizenry and the businesses in Antioch and environs have a strong public interest in the testimony with respect to water quality and, for that matter, quantity.

And the Hearing Officers will be deciding flow criteria. And I think that clearly Dr. Paulsen's testimony should be considered in making those determinations.

CO-HEARING OFFICER DODUC: Thank you, Mr. Keeling.

Mr. Jackson.

MR. JACKSON: As a group that's attempting to represent the environment in the course of this hearing, obviously the native conditions upon which everything evolved is important. And that was, as I understood it, Opinion 1.

The freshness of the water favors native species. The salinity of the water favors exotic species. You'll hear a lot of testimony about that from all of the environmentalists. We're going to start tomorrow is my understanding. And this testimony is directly related to conditions in the ecosystem.

They happen to be measured in Contra -- or at -- I'm sorry. I'm doing the same thing Jolie-Anne did -- measured in the West Delta at Antioch. And it seems to me that their testimony is not only timely but will be connected up by everything that happens for the rest of this hearing.

CO-HEARING OFFICER DODUC: Thank you, Mr. Jackson.

And let's get some clarification. Ms. Ansley or Mr. Mizell, your motion to strike, does it apply to the entirety of Dr. Paulsen's testimony or just the errata?

MS. ANSLEY: No, I believe it applies to the entirety of the testimony. And I'd just like to say, again, that Dr. Paulsen testimony in Opinion 1, which is to her conditions in Antioch pre-1917 or '18, is largely a repeat of testimony that she has already submitted into this hearing.

I do have a problem with things being called helpful without context or in a vacuum. I mean, things are helpful to the Hearing Officers when they're connected to the issues before the Hearing Officers to be determined and also have a demonstrated relevance that's not left to be connected at some future point by some future person in the off-chance that they might

need it. I think that that's not helpful to this proceeding to leave testimony sort of without context or in a vacuum.

And I would say that all that needs to be done is look at the conditions that Antioch is asking to let us know that they're not necessarily looking for flow criteria. They're asking for amendments to a contract and a change in a D1641 compliance point which may itself be outside the scope of this proceeding, asking for a change to D1641.

But I think that that's my last word, and I think that we are seeking to strike Dr. Paulsen's testimony.

CO-HEARING OFFICER DODUC: We'll take it under advise.

Mr. Jackson, did you have something to add?

MR. JACKSON: I just wanted to add to the last point that there are a number of changes in compliance points that are part of this proposal. If we can't talk about changes in compliance points, what happened to the inflow/export at Freeport? They're asking to move that downstream. Well, we're asking -- or what is being asked is that we actually have a compliance point in the West Delta that can take care of not only Antioch, but the critters.

CO-HEARING OFFICER DODUC: Any final word, Mr. Emrick?

MR. EMRICK: Again, I think the testimony was to show the Hearing Officers what the history condition was for outflow purposes, natural flow purposes, and then to demonstrate some ways that, with the tools you have before you, D1641, the boundary scenarios, how that flow might be somewhat restored, not just helping Antioch for its M and I use but also the natural conditions that existed there, looking at public trust, public interest.

CO-HEARING OFFICER DODUC: Thank you. We will consider that during our break and give you a ruling thereafter.

But for now, Ms. Ansley, please proceed with your cross-examination.

CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: If we can bring up Dr. Paulsen's errata testimony, Antioch-500 Errata. And if we could start with Page 4, which is the beginning of Dr. Paulsen's Opinion 1.

Dr. Paulsen you've characterized your historical conditions as pre-1918; is that correct?

WITNESS PAULSEN: The opinion actually says prior to about 1917 but --

MS. ANSLEY: I'm happy to use that correction.

WITNESS PAULSEN: -- almost the same difference.

MS. ANSLEY: That's fine. I want to use whatever terminology you use, actually, so please correct me.

What are the bounds of the time period for the historical evidence that you looked at for determining pre-1917 conditions?

WITNESS PAULSEN: You mean the time frame?

MS. ANSLEY: Yes. When you say "pre-1917 conditions," how far back to your conditions go?

WITNESS PAULSEN: The information that's presented here in the Means report and the DPW report extend back I would as far as Antioch has used water at its intake.

MS. ANSLEY: And was that --

WITNESS PAULSEN: But we have also submitted information into the record that goes hundreds, if not thousands, of years before that.

MS. ANSLEY: Yes, I read Antioch-216.

Antioch first started using water -- and please correct my year. Was it about 1868?

WITNESS PAULSEN: I believe that 1868 was the date that was memorialized, for lack of a better word,

in the 1968 agreement. But I believe that the record shows that water was taken from Antioch's intake location and supplied the city well prior to that probably about 1850 or so. And I'm sure Mr. Emrick can correct me if I have that date wrong.

MS. ANSLEY: Why was 1868 chosen for the 1968 agreement, if you know?

WITNESS PAULSEN: I believe they just counted back a hundred years.

MS. ANSLEY: Isn't it true that Antioch-216, which is an exhibit cited in your testimony -- do you have the exhibit in mind?

WITNESS PAULSEN: I know which one it is, yes.

MS. ANSLEY: That's what I wanted to make sure.

Is it true that Antioch-216 indicates that wetter than normal conditions prevailed in the late 1800s and early 1900s?

WITNESS PAULSEN: I'd have to look back at it. There certainly were wet conditions in that time period.

MS. ANSLEY: Can we look at Antioch-216, Page 20, please. Is that Page 20? I'm sorry. The actual Page 20. Oh, yeah, there. So if you go to the text at the top of that page -- sorry for being

disoriented for a minute.

Do you see this information for Antioch-216, the text at the top that says, "This data indicates that there were wetter than normal conditions in the late 1800s and early 1900s?

(Reporter interruption)

MS. ANSLEY: I apologize.

Do you see this text that indicates -- that says that this data indicates that there were wetter than normal conditions in the late 1800s and early 1900s?

WITNESS PAULSEN: Yes, I see that text.

MS. ANSLEY: Do you have reason to disagree with the assertions in Antioch-216?

WITNESS PAULSEN: Well, I was just clarify that it doesn't mean that every year within that period was wetter than normal. There were wetter years and drier years, as shown in the graph.

MS. ANSLEY: I agree, as this means on average, that time period was wetter?

WITNESS PAULSEN: I think that's correct.

MS. ANSLEY: And I can only ask for your understanding, obviously.

And is it your understanding that the 1920s and 1930s were among the driest decades on record?

WITNESS PAULSEN: I know that they were exceptionally dry. I haven't rank ordered them, but yes, they were very dry. And you can see that in the graphs.

MS. ANSLEY: And the Department of Public Works report that you referenced earlier in your direct testimony, that was in -- that came out in 1931; is that correct?

WITNESS PAULSEN: One was 1924, and one was 1931. I think DPW was 1931 and Means was 1924. I may have those reversed.

MS. ANSLEY: I have written down, if it refreshes your recollection, that Thomas Means was the 1928 report.

WITNESS PAULSEN: '28, yes, I believe that's correct. Yes, DPW was 1931.

MS. ANSLEY: And so both of those reports were issued in time period that were among the driest on record -- or were exceptionally dry, to use your exact testimony. I'm sorry.

WITNESS PAULSEN: Well, those reports were published in 1928 and 1931, respectively, looking at issues that had occurred over several decades prior to that point in time.

MS. ANSLEY: Now, talking about conditions in

the late 1800s and earlier, so you testified that Antioch-216 indeed goes back even thousands of years and looks at all kinds of reconstruction of hydrologic conditions; is that correct?

WITNESS PAULSEN: I wouldn't say all kinds, but it looks at a handful of them.

MS. ANSLEY: It looks at tree ring reconstruction and similar types, indications of indirect indications of hydrology; is that correct?

WITNESS PAULSEN: I'm not sure how indirect they are, but, yes, it does that.

MS. ANSLEY: Okay. Didn't Antioch-216 indicate that the Sacramento-San Joaquin Basin is subject to alternating wet and dry conditions?

WITNESS PAULSEN: It may have. It wouldn't surprise me if it did.

MS. ANSLEY: Is it your understanding that it did, or are you saying you don't recall right now?

WITNESS PAULSEN: I don't recall the exact words, but it doesn't surprise me all.

MS. ANSLEY: Can we call up from -- Mr. Hunt, may we call up from the memory key I just gave you the Fox, et al., study.

Make sure that you can see this perfectly well, Dr. Paulsen. Are you familiar with this study?

WITNESS PAULSEN: I have read it in the past. I haven't read it recently.

MS. ANSLEY: And based on your understanding, is it your recollection that the authors of this study concluded that annual predevelopment outflow could be similar current outflow from the Delta?

WITNESS PAULSEN: It's something like that. I know that they made some conclusions about what the outflow would have been based on a reconstruction of, among other things, plant evapotransporation rates in the Central Valley.

MS. ANSLEY: Can we scroll up to the top? I believe we've marked this -- just to make it clear for the record, we have marked this as cross Exhibit DWR-1153, which I forgot to note in the beginning.

In your testimony or exhibits that support your testimony, is there anywhere I can look to find the historical data that you used to construct the multicolored bars that you showed us earlier on direct for your pre-1917 conditions?

WITNESS PAULSEN: They were based on the information that's in the Means report, the DPW reports, the C&H Sugar information as well as other things. It was -- we don't, of course, have direct measurements of what the salinity was in that time

period. So it was, in my judgment, our best attempt at re-creating what we know from the historical record occurred.

MS. ANSLEY: Okay. So from those historical sources that you just cited to me, which I did look through, was it -- based on reading those historical studies was your overall assumption that the pre-1917 period -- that the conditions in the pre-1917 period was simply that chloride concentration below 250 milligrams per liter was available at low tide in all but three months of the driest years under pre-1917 conditions?

WITNESS PAULSEN: In all but three months of the driest years? I'm sorry. I don't understand.

MS. ANSLEY: Yeah. Let me look at Page 8 of your testimony.

What I'm trying to get at is whether the conditions that you showed us with the multicolored bars that you split out by driest to wettest years, whether you have one overriding sort of assumption that guides the creation of those bars, or do you have variability in measurements in different years?

I believe you just said that you don't have specific measurements but that, from the historical reports, it was my understanding that there was at

least an assumption -- let's look at Page 8. Page 8, Lines 8 to 12 -- that seemed to be how you're characterizing the pre-1917 period.

WITNESS PAULSEN: I'm sorry. Was that a question?

MS. ANSLEY: Yeah, I'm sorry.

WITNESS PAULSEN: I lost the question.

MS. ANSLEY: What I'm looking -- and I did, too, a little bit.

What I'm looking for is when you created -- let's look at Page 8 of your testimony. If you look at -- see the graph that you presented to us earlier? And the bottom, my understanding is that the historical -- oh, and that's probably where I'm getting "pre-1918" -- that the historical conditions that you document there with those bars, what was the data that went into creating those?

WITNESS PAULSEN: It was the information on when water was available at Antioch's intake at a quality suitable for use based on all of that information in the -- much of that information in the historical record.

MS. ANSLEY: And was there one assumption for all years, or is this -- is it the same pre-1918 condition every time? Meaning, here, I think you've

assumed that it's available in all years. But I think earlier you said except a month and a half in the driest year.

Is that the sum total of the characterization of the pre-1917 conditions?

WITNESS PAULSEN: I don't understand that question.

MS. ANSLEY: Okay. Maybe you can tell me, you looked at the different sources that you named to me earlier.

WITNESS PAULSEN: Yes.

MS. ANSLEY: And you came up with what you considered the pre-1918 conditions at Antioch's intake.

WITNESS PAULSEN: Yes.

MS. ANSLEY: Is there a table of data or a table of salinity measurements that creates these conditions, or is it simply a qualitative conclusion from historical evidence that in all but the driest years water was always above the 250 milligram per liter value in all except for the driest years for whatever gaps you showed there in the highest bar.

WITNESS PAULSEN: Again, my reading of the information in the record on the historical salinity condition -- again, there are -- there were no EC meters out in the Delta at that point in time, so we do

not have historical measurements.

My read of the historical information is that the red bar is the 10 percent driest condition, that works water would have been available even in the driest years at low tide between about -- I believe that bar starts in about December through about the end of August. And that's what's reflected that bar.

The bar below it, the orange bar, indicates that the historical record shows that salinity at low tide would have been below the threshold for usability year round 75 percent of the time in 75 percent of the year types. So that is how we created those bars.

MS. ANSLEY: Did the C&H barge data show variations in variability over year types?

WITNESS PAULSEN: Variations in variability?

MS. ANSLEY: In salinity?

WITNESS PAULSEN: Yes.

MS. ANSLEY: And was the only variation in the driest year types in terms of salinity at Antioch's intake that exceeded the 250 milligram per liter threshold, understanding that you do not have EC meters for an exact measurement of 250.

WITNESS PAULSEN: I don't understand the question. Could you please restate that.

MS. ANSLEY: That's fine. I'll move on. I

think I have what I need.

I think what I'm looking for generally is whether there's sort of an overriding assumption from the historical data, or whether there's a table somewhere that gives me purported values, even if they're not exact EC measurements from a meter, that you used to construct those bottom bars.

WITNESS PAULSEN: Well, I mean, certainly the C&H Sugar data, which showed the distance that a barge had to travel from Crockett upstream to find water of useable quality, meaning low enough salinity for the C&H Sugar processing purposes, those data factored into these findings. There is variability, and it's reflected in those data.

I don't know how else to answer your question.

MS. ANSLEY: I'm fine. I can move on.

If we could look at your Table 1, which is on Page 12 of your errata.

Sorry. I do have some questions for -- actually, can we go back to Page 6, Lines 20 through 21, please.

Here you say that the city is not requesting that the historical condition be used as a baseline for flow criteria. Do you see that testimony there?

WITNESS PAULSEN: I do see that.

MS. ANSLEY: Is there a reason, then, that you made comparisons between modeling scenarios and the historical conditions then?

WITNESS PAULSEN: Yes. As stated in the testimony, there were a few reasons for that. One was to identify what the natural condition would have been. Another was to provide information to the State Board and potentially other parties in this proceeding in terms of the salinity at different locations in the Delta for different year types and in relation to what the native species would have experienced in native condition.

MS. ANSLEY: How does a comparison impact what the native conditions were?

WITNESS PAULSEN: A comparison of what?

MS. ANSLEY: With modeling scenarios. How does a comparison with modeling scenarios add to the testimony regarding the -- what your testimony called the historical condition at Antioch if you're not using this as a baseline?

WITNESS PAULSEN: It's a reference point. I mean, we recognized that the salinity conditions in the estuary had changed as the result of a number of actions, many of which probably can't be undone, you know, the channelization of the Delta for example; just

the operation of the State's water resources system.

However, the native species evolved in a condition that looks very different than the last hundred or so years of hydrology in the Delta. So the intention of providing that information was to provide both what the natural condition looks like as well as how that relates to the suite of modeling scenarios that have been presented by DWR in this proceeding.

MS. ANSLEY: When you constructed your pre-1918 historical condition for those graphs, were you relying on evidence in Antioch-216 that predates 1850?

WITNESS PAULSEN: Again, we were relying on the preponderance of evidence. There is evidence in Antioch-216 that predates 1850.

MS. ANSLEY: There is, but did that go into your construction of your pre-1918 conditions that you graphically showed?

WITNESS PAULSEN: Yes, it goes into my understanding of salinity in the Delta generally, yes.

MS. ANSLEY: So it is your contention here today that the conditions under which species evolved in the Delta is reflected by your pre-1918 historical condition?

WITNESS PAULSEN: My understanding is that

native species have been in the Delta for a lot longer than a hundred years and therefore the salinity conditions that existed prior to a hundred years ago may be relevant to what those species are adapted to and how they may respond to changes and conditions within the Delta.

MS. ANSLEY: And having read Antioch-216, how did you use pre-1850 data to come up with your pre-1918 condition? Which data did you use, and how did you incorporate it into the more specific data that you got from the Department of Public Works and the Means report?

WITNESS PAULSEN: Well, for example, some of those data show, again, the ecological conditions that existed at different points within the estuary in a historical condition. And, again, it's just part of the preponderance of evidence that goes to establishing the natural salinity condition in the Delta.

MS. ANSLEY: As you sit here today, can you recall what pre-1850 data you used to conclude that conditions at Antioch, as you reflected in the graph we were looking at before only occur in the -- that conditions that exceed the 250 milligrams per liter, roughly, salinity occurred only in the driest 10 percent of years? Which data did you rely on for

your pre-1850 natural conditions?

WITNESS PAULSEN: Data that went back before that, there are reconstructions based upon tree rings. Those are validated or verified using modern data. There are also data from sediment cores at I think it's three locations within the estuary where the -- the pollens and the plant material that's in those cores can be used to establish the salinity conditions that occurred at the time horizon corresponding to the different depths within the core.

So, again, it's a weight of evidence that, taken together, informs the way we created those bars.

MS. ANSLEY: And do you recall how you translated the tree ring/core studies that translated into flows, I believe -- it was a correlation between tree ring and flow, precipitation; is that correct?

WITNESS PAULSEN: I'd to have look back at that. I believe that's the case.

MS. ANSLEY: And that data would generally show periods of increased and decreased flow; would -- was that correlated with -- was that correlated with other indirect evidence of precipitation?

WITNESS PAULSEN: I don't understand the question.

MS. ANSLEY: I guess what I'm getting at is

you say that you looked at the pollen core studies in Antioch-216. And do you recall exactly what the pollen studies showed?

WITNESS PAULSEN: Yes, I do. I reviewed them last night.

MS. ANSLEY: Okay.

WITNESS PAULSEN: So for example, one of the cores, the one that's most inland, shows -- actually, could we pull it up?

MS. ANSLEY: Sure. Antioch-216, please.

WITNESS PAULSEN: All right. Just a moment; I'll find the page.

It's Antioch-216, and it's Page 17 of the document, which is I think Page 33 of the pdf, yes.

So these are three locations which are shown on the map on the right where sediment cores were collected. The one that is closest to Antioch is the Browns Island core. And what you can see, that Browns Island core is the panel -- of the three panels, the one on the right. What you can see is evidence within that core corresponding to an increase in salinity at the surface of the core, meaning in recent history. So this is one example of that information.

MS. ANSLEY: And so this -- pardon me. And this would show an increase in salinity in the last 100

years?

WITNESS PAULSEN: It appears to, yes.

MS. ANSLEY: Okay. And I'm sorry, I can't -- I don't know what that was -- I don't know when that was published, so I don't know the hundred year time frame.

WITNESS PAULSEN: 2004.

MS. ANSLEY: Okay. So -- oh, thank you. 2004. I don't have my glasses on.

So that would be -- 1894 to 2004 would be the -- roughly the hundred year period?

WITNESS PAULSEN: I don't know exactly when the hundred-year period was, but it was roughly a hundred years before that core was collected.

MS. ANSLEY: 1904 -- right. Okay. So, right, you don't know when the core was exactly --

WITNESS PAULSEN: I don't recall.

MS. ANSLEY: So this doesn't provide necessarily information on salinity levels prior to 1850?

WITNESS PAULSEN: Of course it does.

MS. ANSLEY: Okay.

WITNESS PAULSEN: The farther back you go in the core, as is shown on the left-hand axis, that's the number of years before present, based on the depth of

the core. So this goes back approximately 2500 years.

MS. ANSLEY: Does it say what the salinity was, or does it show a difference in salinity?

WITNESS PAULSEN: It shows, actually, the pollen index, which is a surrogate for salinity.

MS. ANSLEY: Do you remember what the correlation for that surrogate was?

WITNESS PAULSEN: I don't think I understand the question.

MS. ANSLEY: So this is a pollen index. So the pollens they're seeing in the core will correlate to what they consider a certain amount of salinity in the Delta. Do you recall if they ascribed particular ranges of values to the pollen?

WITNESS PAULSEN: I would have to go back in the paper to review the paper and exactly how they did it. But clearly they correlate the salinity that we experience today or within the recent period to a higher pollen index than the salinity deeper in the core and make conclusions about the historical salinity at the Browns Island location based on that information.

MS. ANSLEY: Okay. Looking at Page 7 of your testimony -- and I'm sure he'll keep Antioch-216 handy.

Looking at Lines 3 to 4. And I see your

sentence -- do you see your sentence there, where you say that numerous scientific studies support the idea that native species in the Delta require freshwater flows?

(Reporter interruption)

MS. ANSLEY: I can. I'm over-caffeinated.

Do you see your sentence there on Lines 2 to 4 regarding scientific studies supporting the idea that native species in the Delta require freshwater flows?

WITNESS PAULSEN: Yes,

MS. ANSLEY: Just to make sure we're oriented. That's not a trick question.

Is it your understanding there are also native species in the Delta that require higher levels of salinity?

WITNESS PAULSEN: There may be. I don't have an opinion on that.

MS. ANSLEY: Do you have an opinion whether those species are present at the Antioch intake?

WITNESS PAULSEN: I don't have an opinion on that.

MS. ANSLEY: So I apologize. Going back to your Table 1 now, which is on Page 12.

So looking at your Table 1 -- which provides number of days per year chloride is below 250

milligrams per liter at Antioch, correct?

WITNESS PAULSEN: Yes, at low tide.

MS. ANSLEY: I'm sorry. At low tide.

Doesn't your results of your analysis generally show that H3 and H4 generally provide a greater number of days with chloride below 250 milligrams per liter than EBC2 and the NAA?

WITNESS PAULSEN: Let me review the values. I believe that's true.

MS. ANSLEY: Sure, and take your time.

WITNESS PAULSEN: Yes.

MS. ANSLEY: And to make sure I close the loop on this testimony, what is the biological significance of the number of days per year of chloride below 250 milligrams per liter at Antioch?

WITNESS PAULSEN: Oh, I'll leave that to others to determine. I don't want to wander into offering biological opinions.

MS. ANSLEY: Now, turning to your Table 2 -- and this is the same threshold, 250 milligrams per liter at Antioch, but this is two hours after high tide; is that correct?

WITNESS PAULSEN: Two hours after higher high tide, yes.

MS. ANSLEY: Excuse me, higher high tide. And

the reason why I ask for that sort of confirmation is just so that it's clear when we read the written record. It's quite obvious that you and I can read the title of the chart.

So looking at this Table 2, a similar question: Doesn't Table 2 show that H3 and H4 scenarios have the same or a great number of useable days at Antioch as compared to the NAA?

WITNESS PAULSEN: These appear to be more comparable. In the wettest 10 percent, they appear lower than the EBC2 but higher than the NAA, but they're in the same ballpark.

MS. ANSLEY: And I'm going to be repetitive for just a minute. But what is the -- does your testimony provide any biological significance for number of days per year chloride is below 250 milligrams per liter at Antioch two hours after higher high tide?

WITNESS PAULSEN: I'm not offering any opinions on the biological significance of these numbers.

MS. ANSLEY: And that would be true of Table 3? You're not offering any -- Table 3, which is on Page 17 of your testimony, provides the number of days in each water year that the 250 milligram per

liter chloride threshold for municipal and industrial beneficial use is not met at PP No. 1; is that correct?

WITNESS PAULSEN: That is what's shown in this table, yes.

MS. ANSLEY: And you are providing no testimony regarding the biological significance of this threshold?

WITNESS PAULSEN: No. But one thing that I should have mentioned in the original testimony is that my understanding that the D1641 chloride thresholds are also the operable water quality criteria for recreational uses. So with that overview, other than that, I'm not offering an opinion here. And I'm not offering any biological opinions.

MS. ANSLEY: And am I correct, my understanding is that D1641 allows compliance at either Pumping Plant No. 1 or at another location?

WITNESS PAULSEN: For some of the criteria, yes.

MS. ANSLEY: And like I said, just to close the loop on these questions, doesn't this table again show the H3, and H4 scenarios result in a fewer number of days exceeding the threshold when compared to the No Action Alternative?

WITNESS PAULSEN: Yes, and Boundary 2 even

more, yes.

MS. ANSLEY: For your calculations in Table 3, which equations did you use to convert -- to convert to DSM -- to convert DSM-2 EC-to-chloride? Do you provide that?

WITNESS PAULSEN: We provided it in Part 1.

MS. ANSLEY: Okay. And do you recall -- that was in Antioch's Part 1 testimony?

WITNESS PAULSEN: Well, we made the conversion in a couple of different places. And actually we found -- you found an error with the conversion that we had used. This is the corrected table.

CO-HEARING OFFICER DODUC: How much time do you anticipate needing, Ms. Ansley?

MS. ANSLEY: Maybe ten minutes.

CO-HEARING OFFICER DODUC: Okay. We will finish up with Ms. Ansley, and then Mr. Herrick, do you still have about ten minutes?

MR. HERRICK: I think I can make it five minutes.

CO-HEARING OFFICER DODUC: I would like to be able to excuse Dr. Paulsen before we take our break.

MS. ANSLEY: I will keep an eye on what I can slash through.

So these are the corrected tables using a

formula that you presented in Part 1. You do not recall if that was in your Antioch testimony? I can't recall as I sit here.

WITNESS PAULSEN: I believe that the original table was in the testimony for both Antioch and for Brentwood. It may also have been in Stockton as well.

MS. ANSLEY: But the table you present here is corrected, you're saying?

WITNESS PAULSEN: I believe so, yes.

MS. ANSLEY: Your Opinion 3 discusses Fall X2 as an important component to flow criteria; is that correct?

WITNESS PAULSEN: Yes.

MS. ANSLEY: Is it your understanding that Fall X is a reasonable and prudent alternative, an RPA, in the 2008 Fish and Wildlife Service Biological Opinion?

WITNESS PAULSEN: I don't know how to answer that.

MS. ANSLEY: Do you know if that is the --

WITNESS PAULSEN: I believe Fall X2 comes out of the Biological Opinions, but I don't want to stray into making any sort of a legal conclusion.

MS. ANSLEY: I totally understand. That answer is fine. That's your understanding.

Isn't it true the Fall X2 RPA occurs only in wet and above normal water years.

WITNESS PAULSEN: That may be true. I don't recall the specifics.

MS. ANSLEY: Do you recall what the intended benefit to species of Fall X2 was supposed to be?

WITNESS PAULSEN: Not significantly.

MS. ANSLEY: What is your understanding of Fall X2 in terms of the species it was intended to protect? Do you know?

WITNESS PAULSEN: No, I don't have an opinion on the specific species. I have reviewed that information, but, again, I don't want to stray into offering biological opinions.

I know that there were biologists who believed that Fall X2 was an important measure of water quality relevant to the species, but I don't recall the details.

MS. ANSLEY: Are you familiar with the work of Kimmerer and Jassby regarding the relationship with the X2 line and smelt and salmon?

WITNESS PAULSEN: I am very generally familiar with some of that, but I don't have any opinions of their work.

MS. ANSLEY: Isn't their work cited in your

testimony on Page 17?

WITNESS PAULSEN: Yes, it is.

MS. ANSLEY: But you don't have any opinion on the results of their studies?

WITNESS PAULSEN: Beyond this very general statement that's in my testimony, no, I don't.

And just to be clear, the statement that's in the testimony reads, "Fall X2 was adopted for regulatory purposes because this measure has been linked to the success of various pelagic organisms and it provides a link to fish habitat. When freshwater flows into the Delta are high and the Fall X2 position is pushed seaward, the" -- and here's where the quote starts, "'abundance of numerous taxa increases, implying that the quantity or suitability of estuarine habitat increases when outflows are high.'"

MS. ANSLEY: Is it your understanding, though, from citing Kimmerer 2002a and 2002b, that those studies concluded that Delta smelt did not have an abundance relationship with the location of X2?

WITNESS PAULSEN: I don't have an opinion on that.

MS. ANSLEY: You don't have an opinion on that because you do not know the results of the analysis of those studies?

WITNESS PAULSEN: Because I'm trying very hard not to stray into offering biological opinions. I know others who know much more about this subject than I do have opinions on Fall X2 and it's relation to various species. But I don't intend to offer opinions along those lines.

MS. ANSLEY: Did you review those studies before you cited them in your testimony?

WITNESS PAULSEN: Yes.

MS. ANSLEY: But you don't recall the results of those studies?

WITNESS PAULSEN: I don't recall the details.

MS. ANSLEY: Is there a reason why you chose a quote from the Jassby, et al., study from 1995?

WITNESS PAULSEN: No, only that it expressed generally my understanding of Fall X2 and its relationship to organisms in the Delta.

MS. ANSLEY: So as you sit here today recalling those studies that you've cited, it's your understanding that those studies make conclusions about Fall X2 as opposed to spring-winter X2?

WITNESS PAULSEN: I believe they do.

MS. ANSLEY: I have just -- I'm just going to move through my last four questions really fast.

CO-HEARING OFFICER DODUC: Not too fast,

Ms. Ansley.

MS. ANSLEY: Not too fast. I do need a little bit of sleep and a little less coffee.

Are you aware that the State Water Board's 2010 flow report identified Fall X2 as a Category B criterion? And I can go back and lay a foundation if you need it.

WITNESS PAULSEN: No, I don't recall the detail of that.

MS. ANSLEY: Are you familiar with the 2010 flow report?

WITNESS PAULSEN: Generally, yes.

MS. ANSLEY: Do you understand what a Category B criterion is based on your understanding of 2010 flow report?

WITNESS PAULSEN: I haven't looked at that recently, so I don't recall specifically.

MS. ANSLEY: Are you aware that the State Water Board in that report determined that there was uncertainty with Fall X2?

WITNESS PAULSEN: I don't recall that, but it wouldn't surprise me.

MS. ANSLEY: You don't recall that conclusion or the basis on which that conclusion was made?

WITNESS PAULSEN: Correct.

MS. ANSLEY: No further questions, thank you.

CO-HEARING OFFICER DODUC: Thank you, Ms. Ansley.

Mr. Herrick.

CROSS-EXAMINATION BY MR. HERRICK

MR. HERRICK: Thank you. John Herrick, again, for South Delta parties.

Dr. Paulsen your testimony includes opinions with regards to water quality prior to 1917 in the Delta, correct?

WITNESS PAULSEN: Yes.

MR. HERRICK: And those opinions are derived from your examination of various sources that dealt with information on usable water for various users in the Delta; is that correct?

WITNESS PAULSEN: In part, yes.

MR. HERRICK: Yes, and there are other sources, too. I didn't mean to limit that.

WITNESS PAULSEN: Yes.

MR. HERRICK: And subsequent to your inquiry, you then compared the water quality you determined prior to 1917 with the various water qualities predicted by the modeling for the WaterFix scenario, correct?

WITNESS PAULSEN: Yes.

MR. HERRICK: And in your analysis, did you determine that the water quality prior to 1917 was better on general -- in general than any of the scenarios modeled under WaterFix?

WITNESS PAULSEN: Yes.

MR. HERRICK: And that included a No Action Alternative, too, correct?

WITNESS PAULSEN: And the existing condition, yes, both of those.

MR. HERRICK: And that pre-1917 -- or I don't know if it includes 1917 -- pre-1917 water quality goes back for approximately 50, 60 years, correct?

WITNESS PAULSEN: Oh, at least. But I think, you know, there's information as we were discussing in the sediment cores and the documents that indicate it was much fresher for much longer than just to 1850.

MR. HERRICK: Yes. And back to 1850, 1860, or whatever, that's based upon -- I'll say human records that we have access to, correct, for the most part?

WITNESS PAULSEN: For the most part, yes.

MR. HERRICK: And then there's also data that you examined that goes back further in time, and that also suggests a good water quality for the Delta in general, correct?

WITNESS PAULSEN: Less salinity, yes.

MR. HERRICK: That's what I meant. Sorry. thank you.

WITNESS PAULSEN: Yes.

MR. HERRICK: Are you -- you may not be willing to answer these or not have the background, but are you familiar with the evapotransporation of open water or wetlands, tule lands in comparison to ag lands?

WITNESS PAULSEN: I am generally familiar, yes.

MR. HERRICK: In your analysis, you determined that, after 1917, combination of dry years and increased water use upstream led to water quality issues in the Delta, correct?

WITNESS PAULSEN: Yes, among other factors, but yes.

MR. HERRICK: Yes. And the point of my initial question was do you have an opinion as to whether or not the development of the Delta from open water or tule marsh or other wetlands characteristics into ag land having an effect on the net consumptive use of water upstream of Antioch?

WITNESS PAULSEN: Oh, there's a good question. I have not looked at that explicitly. One of the things that triggered in me earlier though was with

the -- I forget the authors -- Fox, Hutton report -- I know they calculated the flows that would have entered the Delta in the native condition assuming a certain evapotransporation rate for native vegetation.

And I remember having some concerns about the way they did that calculation when I read it.

MR. HERRICK: Yes. Weren't those authors DWR people for the most part?

WITNESS PAULSEN: That, I don't recall.

MR. HERRICK: Dr. Paulsen, at the time you prepared your testimony, is it correct to say you did not have the WaterFix H3+ scenario as a basis to analyze?

WITNESS PAULSEN: That's correct.

MR. HERRICK: And, again, at the time of your -- you prepared your testimony, was it still unclear to you whether or not there was any specific operational scenario of the WaterFix that did or did not include B1 or B2?

WITNESS PAULSEN: I think even for part of the Part 2 testimony, DWR has made it clear that they could still operate within the bounds of Boundary 1 to Boundary 2.

MR. HERRICK: And of course, would you agree that this proceeding might somehow change X2

requirements to increase them perhaps?

WITNESS PAULSEN: I don't know how this proceeding might change X2 requirements.

MR. HERRICK: But do you understand this proceeding may impose criteria on DWR and the Bureau in order to improve the WaterFix petition?

WITNESS PAULSEN: Yes. And I know that there are separate flow criteria proceedings occurring as well.

MR. HERRICK: And until we know what specific X2 or outflow flows are mandated, are we able to analyze the effects of WaterFix on other legal users or the environment or public trust uses?

WITNESS PAULSEN: I don't know how to answer that except to say that we've tried to evaluate some of the impacts by looking at the range of scenarios that DWR has provided -- if that makes sense.

MR. HERRICK: Yes, but my point only was or my question only was getting to the point that we can examine a range of potential flows which you've done by B1 and B2 and other analyses. But until we know specifically, we don't really know anything more to examine other than what we've done.

WITNESS PAULSEN: Right. I don't know yet in the criteria by which they will determine where in that

broad space they'll be operating.

MR. HERRICK: Do you know whether the 150 parts per chloride mandatory -- or excuse me -- 150 parts chloride requirement is pursuant to federal law also?

WITNESS MICHAEL: Oh, I don't know. I'm sorry.

MR. HERRICK: Those are all the questions I have. Thank you for your consideration.

CO-HEARING OFFICER DODUC: Thank you, Mr. Herrick.

I believe that's all the cross-examination for Dr. Paulsen.

Mr. Emrick, do you have any redirect?

MR. EMRICK: No redirect. And then subject to the existing motion, I would move to enter the exhibits, testimony into the record.

CO-HEARING OFFICER DODUC: All right. We will take that under advisement.

Thank you, Dr. Paulsen, for your testimony, both last Friday and today.

WITNESS PAULSEN: Thank you.

CO-HEARING OFFICER DODUC: Is there, Mr. Simmons, a housekeeping matter before we adjourn for our lunch break?

MR. SIMMONS: Yes, Chair Doduc. I did check with Mr. Ferguson, and the Sacramento County witness is available this afternoon and assuming that he would go, but I don't -- it's subject to how you want to handle it.

CO-HEARING OFFICER DODUC: We will see. We have a pretty tight schedule, so if he could just wait, we should know by mid afternoon whether or not we will get to him.

MR. SIMMONS: Very good. Okay. Thank you.

CO-HEARING OFFICER DODUC: Thank you for checking. With that, we will adjourn into closed session starting at 1:30. And we will resume at 2:30.

(Whereupon, the luncheon recess was taken at 1:14 p.m.)

AFTERNOON SESSION

---o0o---

(Whereupon, all parties having been duly noted for the record, the proceedings resumed at 2:30 p.m.)

CO-HEARING OFFICER DODUC: It is 2:30. Please take a seat because we are resuming. At this time, are there any housekeeping matters that we need to discuss?

(No response)

CO-HEARING OFFICER DODUC: Okay.

I see Ms. Des Jardins has joined us.

Does that mean you wish to conduct cross-examination of one of the afternoon panels? I have my list, which is why I'm asking.

MS. DES JARDINS: Yes, I would like to conduct cross-examination of Richard Denton.

CO-HEARING OFFICER DODUC: And how much time do you estimate needing?

MS. DES JARDINS: I'd like to reserve 50 minutes, but it might be less.

CO-HEARING OFFICER DODUC: Did you say 50?

MS. DES JARDINS: 50, yes.

CO-HEARING OFFICER DODUC: Okay. We'll see about that.

(Reporter interruption)

MS. DES JARDINS: Five, zero.

CO-HEARING OFFICER DODUC: Based on that, I'm going to go ahead and say that we will not get to Reza Moghissi -- I apologize for mangling your name -- of Sac County.

MR. BURKE: That's definite?

CO-HEARING OFFICER DODUC: Yes. We have a -- Yes. We may go beyond 5:00, but I do not want to go to 6:00 -- oh, unless Ms. Ansley is withdrawing her cross-exam.

MS. ANSLEY: I am withdrawing my cross-exam of Mr. Moghissi. So if you want to do a little switch-up of the order -- I understand that it's sad that he came here today and would have to come back.

CO-HEARING OFFICER DODUC: So is there any cross-examination at all of Mr. Moghissi?

(No response)

CO-HEARING OFFICER DODUC: No?

And how much time do you need for direct?

MR. BURKE: 15, 20 minutes.

CO-HEARING OFFICER DODUC: Can you do it shorter?

MR. BURKE: 15 minutes?

CO-HEARING OFFICER DODUC: And there is no cross-examination by anybody?

Ah, Mr. Jackson.

MR. JACKSON: How much cross-examination did I ask for for Dr. Lytle?

CO-HEARING OFFICER DODUC: You asked for 30 minutes for Dr. Denton.

MR. JACKSON: I'll make it 20 if somebody else will chip in 5.

CO-HEARING OFFICER DODUC: All right. Would you mind, Mr. Simmons, if we take 15 minutes now for Mr. Moghissi to present his direct?

MR. SIMMONS: Of course not.

CO-HEARING OFFICER DODUC: All right. Let's do that. Thank you for your accommodations.

Mr. Keeling.

MR. KEELING: Tom Keeling for San Joaquin County protestants. I might have been out of the room. I don't recall being asked if I had cross for the City. I do, about ten minutes.

CO-HEARING OFFICER DODUC: Okay. For this panel?

MR. KEELING: City of Stockton, right.

CO-HEARING OFFICER DODUC: Okay. Yes, you were probably out of the room.

MR. KEELING: Okay. Thank you.

CO-HEARING OFFICER DODUC: All right.

So for the benefit of late comers, we are now actually going to Mr. Moghissi from the County of Sacramento since he has a 15-minute direct testimony and no cross-examination.

May I ask you to stand and raise your right hand.

(Witness sworn)

REZA MOGHISSI,

called by Protestant Group 45 as a Panel 2 witness, having been first duly sworn, was examined and testified as hereinafter set forth:

DIRECT EXAMINATION BY MR. BURKE

MR. BURKE: Mr. Moghissi, please state your name for the record.

WITNESS MOGHISSI: Reza Moghissi.

MR. BURKE: And is Exhibit SACO-18 a true and correct copy of your written testimony?

WITNESS MOGHISSI: Yes.

MR. BURKE: Is Exhibit Sac County 19 a true and correct copy of your written statement of qualifications?

WITNESS MOGHISSI: Yes.

MR. BURKE: Is Exhibit Sac County 22 a true and correct copy of an exhibit entitled "Sacramento

County Affected Roadway Segments" that you prepared?

WITNESS MOGHISSI: Yes.

MR. BURKE: And Exhibit Sac County 23 a true and correct copy of a PowerPoint presentation that you prepared for this hearing?

WITNESS MOGHISSI: Yes.

CO-HEARING OFFICER DODUC: Mr. Moghissi, if you will make sure the green light is on on your microphone.

WITNESS MOGHISSI: Thank you.

MR. BURKE: What is your counter job title?

WITNESS MOGHISSI: I'm chief of maintenance and operations at Division of Sacramento County Transportation.

MR. BURKE: And can you briefly summarize your academic and professional background as they relate to your testimony.

WITNESS MOGHISSI: I'm a registered civil and traffic engineer in the State of California with 32 years of experience in design, construction, maintenance, and operations of roadway infrastructure.

Currently I'm working for Sacramento County Department of Transportation as division chief. And prior to employment with Sacramento County, I worked for several state and local agency governments in

various management capacities.

MR. BURKE: And in preparation for your testimony, did you read portions of the WaterFix Final Environmental Impact Report?

WITNESS MOGHISSI: Yes, I did.

MR. BURKE: And was Chapter 19 one of those portions?

WITNESS MOGHISSI: Yes, it was.

MR. BURKE: And now would you like to take the Board through your PowerPoint?

WITNESS MOGHISSI: Sure.

MR. BURKE: If we could bring up Sac County Exhibit 23.

WITNESS MOGHISSI: Okay. My testimony today is to provide the information and my professional opinion on safety operations and physical impacts to the roadways within Sacramento County resulting from the proposed WaterFix construction.

Based on my review of the Final Recirculated EIR/EIS for the WaterFix, I anticipate the construction and operation of the California WaterFix will significantly and adversely change the nature of travel in the Delta. Heavy construction traffic will be introduced to a setting that's accustomed to a rural way of life. Not only will residents and visitors be

affected by the heavy construction traffic, but pavement conditions in the Delta will deteriorate to a point of disrepair.

Construction -- the impacted roadways have to be reconstructed perhaps more than once during the course of the project construction.

Next slide, please.

It is important to note the physical characteristics of the Delta road. They have narrow pavement with limited or non-existent shoulder, often drainage ditches on one or both sides of the roadway, built of levees that were constructed from native soils. Many roads that are not on the levees are at or below sea level. The ground moves with the tides. And roadways are old and in poor condition. Bridges are at capacity and too narrow for constant truck traffic.

These characteristics, along with constraints caused by the levee beneath the roadway were recognized by the Sacramento County Maintenance and Operations staff. We learned that we cannot view these roads quite the same way as other roads in the county. Often the roadway standards that we use elsewhere would not be appropriate for these roadways.

Next slide please.

The EIR acknowledges as a result of project

construction traffic some Sacramento County Delta roads will experience significant traffic volume increases, in some cases, four to five times greater than the current volumes. However, the traffic analysis concludes that the decline in the level of service will not be significant enough to trigger the need for mitigation measures.

The roadway -- I disagree with that conclusion because the roadway segment traffic analysis does not fully consider the physical characteristics of Delta roads in determining the level of service during project construction. The traffic operations analysis has left out an intersection level analysis citing insufficient information regarding construction traffic patterns. Intersection operations in the study area within the commercial centers of the Delta and at bridges, especially drawbridges, pose a real concern during construction of the project.

It highly expected that the project impacts will be greater than what has been determined by the project roadway traffic operation analysis.

Next slide.

With respect to construction traffic impacts on the pavement, the Final EIR uses PCI, pavement condition index, as a way to determine if a road is

deficient or acceptable. Pavement conditions index is used as a metric to describe the surface conditions of the roadway. The analysis deems the existing pavement conditions as acceptable if the PCI is greater than 55. The PCI does not take into account the pavement structure or pavement structural section beneath the surface. The PCI 55 for an engineered roadway has vastly different capacity to withstand truck loading impacts compared to a PCI 55 for a rural farm road built on poor soil with no engineered structural section.

The Final EIR does not make this important distinction, and consequently the impacts of the construction activities in the study area will be far worse than what has been projected in the report.

Next slide.

According to EIR of the 16 Sacramento County roads within the study area, 9 roads have a PCI below the PCI threshold of 55. The Final EIR surprisingly concludes that roads with PCI above 55 will not be impacted regardless of the heavy truck traffic that they may be subjected to.

For example, the EIR shows Lambert Road between State Route 160, which is called River Road, and Herzog Road as currently in acceptable condition,

however, hourly trip will be significantly higher, and the projected traffic will be from 35 vehicles per hour to 650 vehicles per hour. The substantial number of truck trips and other construction-related trips for the project will quickly deteriorate the PCI on Lambert Road to levels well below 55 in a few days.

Nearly all Sacramento County roads in the study area, whether they have an existing pavement deficiency or not, will quickly deteriorate to a PCI less than 55 after a few weeks of heavy truck traffic generated by project construction.

Next slide.

The EIR identifies 16 Sacramento County roadways within the study area with potential construction routes. In addition to the roadways identified in the analysis, there are 14 roadway segments that are either adjacent to or in close proximity to the project construction sites. These roadway segments will be impacted either directly or indirectly by the construction activity associated with the project.

Next slide -- and maybe the one after that.

Here what we have, all those 14 roads are listed, and the limits are given -- are depicted on this slide. But can I go to the next slide, please.

This map shows some of the adjacent roads within the study area. For example, Herzog Road, Vorton Road, Russell Road, and Terminus Road will be negatively affected because they are adjacent to the EIR study segment and will provide an accessible alternative route.

Based on my experience, truck drivers have the tendency to use the shortest and easiest route every time, regardless of the designated construction routes. They pay for their fuel and may get paid by the load.

Can we go to the next slide.

During construction of the proposed project, varies materials would be transported to and from the construction area in heavy trucks. The immediate impacts of such heavy truck traffic on the Delta roads will be the crumbling of the roadway surface to a point it would be impassible or very hazardous for truck traffic. The EIR mitigation for pavement impacts is insufficient. Mitigation Measures Trans 2A and Trans 2B call for prohibiting or limiting construction activities on existing physically deficient roadway segments infeasible.

Most of the Delta roads planned or unplanned for use by the contractors will be physically deficient after a few weeks of construction trips. It would be

infeasible to prohibit construction trips.

Mitigation Measure Trans 2C addresses the effect of construction traffic on roadways that currently have unacceptable pavement conditions by improving the affected roadways. The EIR identifies only five County road segments meeting the requirements of Trans 2C.

Next slide, please.

Project construction traffic will greatly increase an already lengthy law enforcement response time to the residents of the River Delta communities. Current emergency response times to the community of Locke, Hood, Isleton, and many recreational slough and islands will increase from 25 minutes to more than 60 minutes.

The only mitigation noted, Trans 1C, is a good faith effort to enter into an agreement to enhance capacity of the affected roads. This measure is illusory, indefinite, and does not guarantee that the mitigation or improvements will occur.

Moreover, the impact discussion indicates that Mitigation Measure Trans 1C will not reduce the severity of the impact to a less than significant level. This will adversely affect law enforcement response and community safety for a period of nine to

12 years.

And the next slide.

MR. BURKE: That's it.

WITNESS MOGHISSI: Oh, let me, then, conclude.

The project will introduce construction activities of magnitude and proportion never before seen in the Delta. The EIR does not accurately assess or acknowledge impacts to Sacramento County Delta roads. Delta roads characterized as acceptable will quickly fail under project construction traffic.

Substantial road construction therefore must been considered in advance of WaterFix construction. The construction of the impacted roadways would have to be repeated during the course of project construction. Local jurisdiction cannot be burdened with the costly road repairs during project construction. Nevertheless, the delays, disruption, and intrusion to local residents, businesses, employees, and visitors will likely have permanent effects.

That's my -- concludes my presentation.

MR. BURKE: And I have no further questions for him.

CO-HEARING OFFICER DODUC: Thank you.

And seeing no cross-examination at this point, does this conclude the County's case in chief?

MR. BURKE: It does. And we would like to move all of our exhibits into the record.

CO-HEARING OFFICER DODUC: Are there any objections?

MS. ANSLEY: This is County of Sacramento?

CO-HEARING OFFICER DODUC: Correct.

No objections?

MS. ANSLEY: No objections.

CO-HEARING OFFICER DODUC: Then all Part 2 exhibits are hereby moved into the record.

(Protestant Exhibits SACO-1 through SACO-4 and SACO-10 through SACO-23 admitted into evidence)

CO-HEARING OFFICER DODUC: Thank you, Mr. Moghissi.

WITNESS MOGHISSI: Thank you.

CO-HEARING OFFICER DODUC: All right. And thank you Mr. Simmons and Mr. -- Dr. Lytle and Mr. Granberg who are accommodating that switch. And now we'll ask you to come back up.

Before you get too comfortable, could you please rise and raise your right hands.

(Witnesses sworn)

DR. MEL LYTLE and ROBERT GRANBERG, called by Protestant Group 22 as

Panel 1 witnesses, having been first duly sworn, were examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you.

Mr. Simmons, do you wish to make an oral opening statement?

MR. SIMMONS: Yes, thank you, a brief one.

Good morning. For the record, I am Paul Simmons, counsel for City of Stockton. And I am in the company of Deputy City Attorney Tara Mazzanti, who is right there in the crowd.

Vice Mayor Holman presented a Phase 2 policy statement on behalf of the City. And as I said, I just have a brief orientation to the testimony that we'll give for Part 2.

The City's witnesses are Dr. Mel Lytle, who is now the assistant city manager for the City of Stockton and a former chief head of municipal utilities, director of municipal utilities. And the second witness is Robert Granberg, who's currently the assistant director of municipal utilities for Stockton.

During Phase 1, there was testimony by Dr. Paulsen and others associated with adverse changes and the quality of the water of the lower San Joaquin

River associated with WaterFix as well as the inadequate or nonexistent evaluation of those impacts by the proponents at the locations that actually divert water for the City of Stockton. And Stockton presented evidence in Part 1 which was directed at injury to the City as a lawful user of water.

In Part 2 there is testimony; this testimony relates to the City's interests and the interests of its citizens from the perspective of this city as a utility. And there are two components to that. One is as a wastewater utility and another as a water utility.

These functions, specifically for Stockton are very closely related together in many ways and some that are unique to anyone in California so far as I know. But in general, changes in Delta water quality can affect the City's compliance obligations with respect to wastewater; they can affect the City's ability to divert water associated with compliance with its wastewater permit discharge; and they can cause impacts to overdrafted groundwater supplies indirectly there relied upon by the City.

Ultimately, there's an interest here associated with the persons served by the city irrespective of the City being an injured water right holder. So we will cover those two topics.

And the City's conclusion is that the Board should deny the petition as proposed unless sufficient conditions are imposed to address these topics.

So we'll turn the witnesses then.

And Mr. -- Dr. Lytle will testify first. Dr. Lytle, are you familiar with Stockton Exhibit 57 titled "Part 2 Testimony of C. Mel Lytle, Ph.D."?

WITNESS LYTLE: Yes.

MR. SIMMONS: And is Stockton Exhibit 57 your testimony?

WITNESS LYTLE: Yes.

MR. SIMMONS: So can you please summarize your written testimony?

WITNESS LYTLE: Be happy to. With a population of nearly 315,000, City of Stockton is the largest municipal -- municipality within the Delta. The City is an in-Delta municipal water user like other in-Delta cities, counties, and districts where Stockton's drinking water is diverted from the San Joaquin River at Empire Tract for beneficial use under State-approved water right.

The City is acutely aware of and concerned with changes in Delta water quality due to possible future impacts from the California WaterFix and this water rights change petition.

The petition is not in the public interest especially with respect to the City and, in part, because Stockton may be required to invest significant resources in additional substitute water supplies and treatment technologies, essentially shifting the burden of the project's impacts on the City.

To improve its regional water supply portfolio and reduce groundwater pumping from the critically overdrafted San Joaquin Basin, the City has made major capital improvement to its water supply and wastewater systems. Stockton's ratepayers invested over $220 million to construct the Delta Water Supply Project Phase 1 which provides up to 30 million gallons per day of drinking water to the City.

The potential adverse consequences of the proposed petition on our drinking water supply is of great significance to the City. Potential WaterFix-intake-caused alterations and flows in the Sacramento and San Joaquin rivers will negatively impact our water quality. As communicated repeatedly to the petitioners, the City is concerned with any adverse changes to or in the San Joaquin River, its water quality that supplies our water supply intake, or our point of discharge from our wastewater treatment plant.

Why should Stockton bear the financial burdens of adverse changes in water quality caused by WaterFix?

To answer my question, it shouldn't. Our rate payers should not be responsible for WaterFix burden. It is imperative that standards set by this Board to protect beneficial uses of in-Delta municipal water users be enforced and not ignored for the benefit of WaterFix.

The recent historic drought and the State-mandated conservation measures hit the City's water utilities especially hard with significant reductions in revenues that delayed needed system maintenance, reduced staffing, and extended planned project delivery, as many other agencies in this state were faced with.

This necessitated the passage of a new water right -- or new water supply rate increase of 38 1/3 percent in 2016. The City's water utility ratepayers include economically disadvantaged groups and have been required to shoulder rate increases due to the City's significant investment in its water supply and wastewater infrastructure that have been necessary to meet many of the specific project permit conditions.

Our city contains many families and

individuals whose incomes are below the federally recognized poverty level. About 21 percent of families, 35 percent of children, 22 percent of adults and 13 percent of seniors are considered impoverished. Our public outreach meetings that we held based on this water supply rate increase, many of those ratepayers spoke expressing great frustration, as you can imagine , over the concern of water rate increases for particularly the low-income and disadvantaged residents as well as low-income renters and things like that that are in our community.

The predicted reduction in water quality at our Empire Tract intake, particularly increased salinity, caused by WaterFix would require the City to make additional investments in technology such as desalinization or pay for other costly infrastructures to maintain water quality, causing an unfair financial burden on the city's ratepayers and is not in the public interest.

In my opinion, it is against good public policy and not in the public interest to shift any financial burden of dealing with WaterFix caused by water quality degradation in the Delta to Stockton's ratepayers for the benefit of South of Delta exporters or Southern California interests.

If Stockton was required to protect the project proponents' water supply interests as part of its drinking water supply project permit approvals, then the petitioners must equally be required to protect Stockton's water supply.

To conclude, these significant concerns must be addressed before the change petition should be considered. If WaterFix moves forward with unmitigated impacts, it will be Stockton's most vulnerable citizens who must may the price for those impacts to its water supply and wastewater treatment. How would we face our citizens again to increase rates based on covering WaterFix costs? We can't.

So I ask this Board, when considering whether to grant or deny this change petition and whether this project is in the public interest, please remember that Stockton has invested hundreds of millions of dollars in renewing and updating its regional water supply portfolio and wastewater treatment processes to comply with strict standards advocated by the WaterFix proponents and that placing the project's financial environmental burdens on Stockton is unfair and unjust. As proposed, WaterFix is not in the public interest, and the change petition should be denied.

However, if this Board decides to grant the

petition, then the petitioners' permits must include necessary terms and conditions to protect Delta -- Stockton's in-Delta municipal water use, where the petitioners must bear the full financial burdens for mitigating their impacts that may cause the City to pay for supplemental water supplies and improvements in water treatment technology. Thank you.

MR. SIMMONS: Thanks you, Dr. Lytle.

Mr. Granberg, are you familiar with Stockton Exhibit 54, titled, "Part 2 Testimony of Robert Granberg, P.E."?

WITNESS GRANBERG: Yes, I am.

MR. SIMMONS: Is that your testimony?

WITNESS GRANBERG: Yes, it is.

MR. SIMMONS: Would you please summarize your testimony.

WITNESS GRANBERG: Thank you for the opportunity to be here today to provide oral testimony on behalf of the City of Stockton.

It has been nearly a decade since the City first commented on the project now known as California WaterFix, beginning with the BDCP EIR/EIS Notice Of Preparation in May of 2008.

The City continues to be concerned with water quality impacts to the Sacramento and San Joaquin

Delta, particularly the San Joaquin River caused by the ever changing project known as the WaterFix. The unmitigated impacts of this project will most certainly affect the City's ability to discharge treated wastewater, a critical service provided to our citizens and for the health, safety, and economic vitality of the Stockton region.

The City has and continues to invest millions to achieve permit imposed treated wastewater effluent limits through the National Pollution Discharge Elimination System process of the EPA and Central Valley Water Quality Control Board.

Petitioners have neither acknowledged these impacts nor proposed mitigation measures to address them. By failing to address these impacts, petitioners have shifted the burden of mitigating the impacts of the WaterFix onto Stockton. Specifically, the WaterFix will have negative water quality impacts to the Delta specifically, particularly due to the alterations in flows of the Sacramento and San Joaquin rivers that will ultimately result in additional costly treatment on the City of Stockton.

Even seemingly small increases in the mass or concentration of various water quality constituents caused by the WaterFix may result in the City's

inability to comply with it's NPDES permit and force the City to add treatment processes at a significant cost to its ratepayers.

For example, an increase in-Delta salinity will not only impact drinking water quality for Stockton's water customers but will increase the level of salinity discharge from the wastewater treatment plant, potentially requiring additional costly treatment at both water and wastewater treatment plants.

This cost would further burden economically disadvantaged persons and has the potential of turning away industrial development from the city. The city is already implementing a project to reduce nutrients in the wastewater treatment process. Further degradation of Delta water quality caused by an increase in nutrient loading could result in even more costly treatment requirements.

Lastly, the City's wastewater discharge is the target for the cause of low dissolved oxygen levels in the Stockton deepwater ship channel that would be further hindered by the low flow conditions brought about by the WaterFix operation.

In summary, the petitioners have failed to acknowledge and address the significant adverse impacts

of the WaterFix on the city and have shifted the burden of poor Delta water quality caused by the project onto the city and it's residents.

In the public's interest, you must reject the petition before you, demand any future efforts of the WaterFix proponents to bring forth sound, peer-reviewed science that identifies project impacts and avoids placing project mitigation on the City of Stockton.

Any project proposal that defers operational decisions makes general Delta-wide minimum standard commitments and ignores the City of Stockton's interest should be rejected by this Board until the appropriate assurances are provided in the form of permit terms and conditions that would avoid any harm to the city's water supply or its ability to comply with its NPDES permit, including potential harm should approval of the change petition lead to more stringent NPDES permit standards.

Thank you for your time and consideration of the City of Stockton's concerns regarding this project, and we trust that you will make the right decision that considers Stockton's rights in this matter.

Thank you.

MR. SIMMONS: Okay. These witnesses are available for cross-examination.

CO-HEARING OFFICER DODUC: Thank you. I believe I have DWR, Mr. Herrick, and Mr. Keeling as the only cross-examination for this panel. And Mr. Herrick is now declining.

All right. So Ms. Ansley, followed by Mr. Keeling.

MS. ANSLEY: We have no questions for Dr. Lytle, I'm not sure if I said that.

(Reporter interruptions)

CO-HEARING OFFICER DODUC: Ms. Ansley said she does not have any questions for Dr. Lytle.

Mr. Keeling, are your questions for both witnesses or just one or the other?

MR. KEELING: They are for both.

CO-HEARING OFFICER DODUC: All right.

Sorry, you don't get to leave.

MS. ANSLEY: Can you just give me a second? I'm seeing if I can actually eliminate a line of questions.

CO-HEARING OFFICER DODUC: And while she's doing that, let me give you fair warning that we might be going a little bit late today, no later than 6:00 o'clock, but as late as we can to see if we can get through with Dr. Denton.

We'll try, Dr. Denton, to not let you come

back tomorrow, but I can't guarantee it.

CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: Mr. Granberg, my couple questions are all for you.

You previously submitted testimony in Part 1 of the this proceeding; is that correct?

WITNESS GRANBERG: Correct.

MS. ANSLEY: And this was Stockton 10 and Stockton 39, if you recall.

WITNESS GRANBERG: I don't recall the numbers.

MS. ANSLEY: And impacts from purported -- impacts to salinity and impacts to nutrients were the subject of your Part 1 testimony; is that correct?

WITNESS GRANBERG: Yes, in part.

MS. ANSLEY: And you also mentioned in your Part 1 testimony impacts to -- potential impacts to the City's compliance with its NPDES permit; is that correct?

WITNESS GRANBERG: I don't recall.

MS. ANSLEY: Do you recall Stockton submitting rebuttal and surrebuttal testimony on nutrients and electrical conductivity?

WITNESS GRANBERG: I believe so. I don't -- it's been a while.

MS. ANSLEY: Looking at your current

testimony, which is Stockton 54, do you have a copy of that in front of you?

WITNESS GRANBERG: Yes, I do.

MS. ANSLEY: Always let me know if you want to take a moment to look at something in context.

Isn't it true that some of the concerns you raised in Stockton 54 pertain to potential future changes to the City's requirements under its NPDES permit?

WITNESS GRANBERG: I did use that word in my testimony, "potential," correct.

MS. ANSLEY: And then I think I only have a couple questions for you on your testimony regarding dissolved oxygen, which is Page 7, Lines 10 through 27.

So on Page 7, you raise concerns about dissolved oxygen in the Stockton deepwater ship channel; is that correct?

WITNESS GRANBERG: Yes.

MS. ANSLEY: And you state on Lines 18 to 21 that future San Joaquin River conditions that result in lower river flow or higher nutrient loading in the Stockton deepwater ship channel caused by project operations could result in lower limits for ammonia and other oxygen-demanding substances; is that correct?

WITNESS GRANBERG: That's correct.

MS. ANSLEY: Are you familiar with Chapter 8 of the FEIR?

WITNESS GRANBERG: I have read it, yes.

MS. ANSLEY: What is the basis of your statement that the Cal WaterFix would decrease flows in the San Joaquin River?

WITNESS GRANBERG: I don't have that analysis in front of me, but that's what we concluded from the EIR/EIS and studies that we conducted for Part 1.

MS. ANSLEY: Isn't it true that modeling under Alt 4A in the FEIR showed that flows would be similar between the No Action Alternative and Alt 4A with little to no change in Vernalis flow?

WITNESS GRANBERG: I don't have that in front of me, so I can't say for sure.

MS. ANSLEY: Can go to SWRCB-102, Page -- excuse me. Chapter 8. Can go to Page 8-934.

Can we flip to the next page for just a moment, and go back up to 934.

Is it your understanding that the FEIR looked at dissolved oxygen levels under the proposed action Alt 4A in the FEIR? If you look at Lines 26 and 27?

MR. SIMMONS: Could I ask, I can't see what page --

MS. ANSLEY: I'm happy to blow it up.

MR. SIMMONS: What page is this?

MS. ANSLEY: It's 8-934, Chapter 8.

MR. SIMMONS: Then I want to interpose an objection on foundation and relevance.

CO-HEARING OFFICER DODUC: I don't believe your microphone is on.

MR. SIMMONS: Oh, I'm sorry. I would to interpose an objection on foundation and relevance. This isn't the page of the EIR that's referred to in his testimony.

MS. ANSLEY: Mr. Granberg testified that he was familiar with Chapter 8. This is a page in the Alt 4A analysis that talks about -- it talks about dissolved oxygen in the Stockton deepwater ship channel.

CO-HEARING OFFICER DODUC: Overruled.

MS. ANSLEY: And so is it your understanding the FEIR concluded that flows for Alt 4A would be similar to that under the NAA and existing conditions?

MR. SIMMONS: Objection, foundation. He's testified that he's read it, probably not this morning or within the last three months, so I --

CO-HEARING OFFICER DODUC: Are you able to answer, Mr. Granberg?

WITNESS GRANBERG: Like I said, I have read it but I'm not -- you know.

MS. ANSLEY: So as you sit here today, you do not remember the analysis done by the FEIR on dissolved oxygen in the Stockton deepwater ship channel?

WITNESS GRANBERG: I can't speak to it today, no, in detail, no.

MS. ANSLEY: And you don't recall -- you don't recall the -- similarly, you don't recall the analysis of flows at Vernalis under the Alt 4A and the No Action Alternative?

WITNESS GRANBERG: Not in detail today without reviewing it.

MS. ANSLEY: I think we're fine. We don't have any further questions.

CO-HEARING OFFICER DODUC: Thank you, Ms. Ansley.

Mr. Keeling.

CROSS-EXAMINATION BY MR. KEELING

MR. KEELING: Mr. Herrick offered to give me his minutes, too.

CO-HEARING OFFICER DODUC: Mr. Herrick wouldn't do that without checking with me first. Of course, Mr. Ruiz would just go to staff.

MR. KEELING: Tom Keeling on behalf of the San

Joaquin County protestants. I have questions for both witnesses. All of these questions go to the question of -- go to the issue of petitioners' outreach to the City of Stockton.

Let me ask you first, Mr. Granberg. Were you consulted by the Department of Water Resources in connection with the preparation of the petition for change?

WITNESS GRANBERG: No, not that I recall.

MR. KEELING: Were you consulted by the Department of Water Resources in connection with preparation of the FEIR?

WITNESS GRANBERG: No, not that I recall.

MR. KEELING: In connection with any earlier environmental review documents?

WITNESS GRANBERG: Related to the WaterFix?

MR. KEELING: Earlier than the Final EIR.

WITNESS GRANBERG: No, not that I recall.

MR. KEELING: Were you contacted by the Bureau of Reclamation on any of these points?

WITNESS GRANBERG: No, not that I recall.

MR. KEELING: Were you consulted or contacted by DWR in connection with the impact or potential impact of the California WaterFix on water quality at the diversion points used by the Delta Water Supply

project?

WITNESS GRANBERG: No, I was not.

MR. KEELING: Were you contacted by the Department of Water Resources at any time in connection with water quality issues that might impact the Delta Water Supply project itself as a result of the WaterFix?

WITNESS GRANBERG: No.

MR. KEELING: Were you ever contacted by DWR about WaterFix's potential impact on future water supply needs of the City of Stockton at all?

WITNESS GRANBERG: No.

MR. KEELING: Have you at any time been contacted by either the Department of Water Resources or the Bureau about securing suitable substitute water supplies for the City as a result of impacts from the California WaterFix?

WITNESS GRANBERG: No, I have not.

MR. KEELING: Mr. Granberg, are you familiar with the Sustainable Groundwater Management Act, SGMA?

WITNESS GRANBERG: I'm familiar with it. I've not read it. I'm not involved in that.

MR. KEELING: Does the City of Stockton have any obligations with respect to compliance with SGMA to your knowledge?

WITNESS GRANBERG: Not that I'm aware of.

MR. KEELING: Have you been contacted at all by the Department of Water Resources or the Bureau -- let me break it up -- just Department of Water Resources with respect to California WaterFix's potential impact on the City's ability to discharge wastewater in compliance with the requirements of state or federal law?

WITNESS GRANBERG: No.

MR. KEELING: Same question with respect to the Bureau of Reclamation. Have they contacted you?

WITNESS GRANBERG: No, they have not.

MR. KEELING: Has the Department of Water Resources offered to assist the City of Stockton financially if, as a result of the WaterFix, the City incurs additional costs in its operation of the Delta water supply project?

WITNESS GRANBERG: No.

MR. KEELING: Well, if such additional costs were incurred as a result of WaterFix, who would pay those costs?

WITNESS GRANBERG: Presumably the ratepayers of the City of Stockton.

MR. KEELING: Dr. Lytle, were you listening to the questions I asked Mr. Granberg?

WITNESS LYTLE: Yes.

MR. KEELING: I'm going to try to abbreviate it a bit.

WITNESS LYTLE: Okay.

MR. KEELING: Have you been contacted by the Department of Water Resources in connection with any of the potential WaterFix impacts I referenced in my questions to Mr. Granberg?

WITNESS LYTLE: Let me put it this way. So far, though we have been participatory in probably every proceeding about the Delta and improvement to the Delta the petitioners have agreed to move forward on over the last -- when was the Delta Dream study? I mean, that was 10, 15 years ago -- we've been there.

But in all our communications with these petitioners, we've asked for communication, but unfortunately, we've always been a bridesmaid instead of the bride, so to speak.

MR. KEELING: Would your response be the same if I asked you about the Bureau of Reclamation?

WITNESS LYTLE: Yes, it would.

MR. KEELING: Are you aware of any plans on the part of the Department of Water Resources, the Bureau, or any other agency to create a plan to assist the City financially if, as a result of WaterFix, the

City incurs additional costs in connection with the operation or maintenance or repair of the Delta Water Supply project?

WITNESS LYTLE: Well, we would hope so. I mean, as an in-Delta municipal water user, we've heard of other agencies that have been in discussions with DWR over potential impacts to water quality at their intakes. What makes us any different?

MR. KEELING: Your answer is no?

WITNESS LYTLE: Correct.

MR. KEELING: Earlier, you said you had been participating in this process. Do I fairly infer from that that you're referring not just to the California WaterFix but to its predecessor name under Bay-Delta Water Conservation Plan?

WITNESS LYTLE: Correct, even before that.

MR. KEELING: And by "participation" you mean the City has had representatives at hearings and meetings?

WITNESS LYTLE: Yes, of course.

MR. KEELING: And by submitting written material?

WITNESS LYTLE: Written material on all the various environmental documents, various plans as they've been produced. Comments have been included in

the drafts, of course. This is -- we're not going away. This is very important to us. This is -- I mean, I don't think folks quite understand the City of Stockton has been very, very forthright in trying to engage because of the importance of this and that we've been essentially trying to live by what we're asking for in the sense that we've done millions in improvements to our regional water supply portfolio.

And that's so much the cause -- so much our cause trying to spread that message throughout the State. And we've engaged not only within ourselves and other cities, the County, but also our neighbors, Sacramento, Stanislaus, Calaveras.

We have an inter-regional IRWMP with our upstream folks in Almador, Calaveras, and Alpine counties that go all the way out to East Bay MUD. So we are all trying to work very closely together, to try to figure out what our issues are. But at the same time there's this void of communication or anything from potentially the greatest impact to us ever in our future.

MR. KEELING: Has anyone at DWR explained to you why there's been this absence of communication concerning the impacts of WaterFix on the City of Stockton?

WITNESS LYTLE: No, and it's quite perplexing in the sense that we're fully engaged in SGMA. We're members of a new JPA in San Joaquin County that has 17 members. DWR's fully engaged with us in that scenario. We've just recently been -- I think that JPA has been awarded a $1.5 million grant to help with our groundwater sustainability plan.

And we've received a disadvantaged community waiver to help reduce the overall costs of the plan effort. So it's perplexing to us in the sense that one side of DWR talks to us but the others don't. So it's kind of funny that way.

MR. KEELING: Well, in the midst of the SGMA compliance activities, no one at DWR has communicated to you about the potential impact of WaterFix on the City of Stockton's efforts to comply with SGMA?

WITNESS LYTLE: Not in those terms. It's a little different. But you can understand that we see it as a potential huge impact to our area because what are we trying to do? We're trying to solve a problem of a critically overdrafted groundwater basin. And if our potential supplies to do that dry up, what happens? It sends us right back to overdrafting a critically overdrafted groundwater basin.

MR. KEELING: Am I correct in understanding

that one of the rationale for constructing the Delta Water Supply project in the first place was to relieve or reduce the City of Stockton's reliance on groundwater?

WITNESS LYTLE: Absolutely. Not only that, but the efforts prior to that to take increased surface water from New Melones and the Calaveras and Hogan system to Stockton East is essentially, correct me if I'm wrong, Bob, but it's brought the groundwater levels underneath the City, wherein the greatest overdraft had occurred historically, up over 30 to 35 feet because of the increased use of surface water.

MR. KEELING: Am I correct in understanding that one of the incentives for entering into the Delta Water Supply project in the first place was to advance the policy in favor of areas of the state developing their local water supplies?

WITNESS LYTLE: I'm sorry. Absolutely.

MR. KEELING: Thank you.

I have no further questions.

CO-HEARING OFFICER DODUC: Thank you, Mr. Keeling.

Any redirect, Mr. Simmons?

MR. SIMMONS: No.

CO-HEARING OFFICER DODUC: At this time, does

this conclude --

MR. SIMMONS: I would move Stockton 54 through 60 into evidence.

CO-HEARING OFFICER DODUC: Any objections? Not seeing any, they are so moved. Thank you all.

(Protestant Stockton Exhibits STKN-54 through 60 admitted into evidence)

CO-HEARING OFFICER DODUC: Okay. Do you need a break, Debbie, or can we continue?

(Discussion off the record)

CO-HEARING OFFICER DODUC: Okay. So let's ask Dr. Denton to come up, and we'll take a break after he completes his direct.

Dr. Denton, if I might ask you to please stand and raise your right hand.

(Witness sworn)

CO-HEARING OFFICER DODUC: Thank you.

DR. RICHARD DENTON,

called by Protestant Group 25 as a Panel 1 witness, having been first duly sworn, was examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Does Contra Costa County have an opening statement? I know you submitted a written one, but do you wish to make an oral one?

MR. KELLER: Kurtis Keller for Contra Costa County and Contra Costa County Water Agency.

We did submit a written opening statement, and we'll leave it at that. I won't read that into the record.

DIRECT EXAMINATION BY MR. KELLER

MR. KELLER: With me is Dr. Richard Denton. Our case in chief and Dr. Denton's testimony is being submitted jointly with Solano County.

CO-HEARING OFFICER DODUC: All right.

MR. KELLER: Dr. Denton, is CCC-SC-2 a true and correct copy of your statement of qualifications?

WITNESS DENTON: It is.

MR. KELLER: Is CCC-SC-3 a true and correct copy of your written testimony?

WITNESS DENTON: Yes, it is.

MR. KELLER: CCC-SC-4 through 37, excluding 29 and including 6 Errata true and correct copies of the exhibits referenced in your testimony?

WITNESS DENTON: Yes, they are.

MR. KELLER: Is CCC-SC-1 a true and correct copy of the PowerPoint presentation that you'll utilize with your testimony?

WITNESS DENTON: Yes, it is.

MR. KELLER: Thank you, Dr. Denton. Will you

please proceed to summarize your testimony.

WITNESS DENTON: Hearing Officers Doduc and Marcus and Board Member D'Adamo, my name is Dr. Richard Denton, and I'm a water resources consultant. I've been working on Bay-Delta issues since 1983. In fact, during the mid '80s, when I was at UC Berkeley on the civil engineering faculty, I prepared four detailed reports for the State Board on currents and water quality in the San Francisco Bay.

And I've been involved in Bay-Delta water rights and water quality hearings and -- since 1989, including CCWD's Los Vaqueros project permitting and development of the 1994 Bay-Delta Accord. And I'm appearing today as an expert witness on behalf of Contra Costa County and Solano County.

Can we have the PowerPoint, please.

My main purpose today in my testimony is to show ways in which the WaterFix proposed project is not in the public interest.

As will be discussed in more detail by other parties, the WaterFix proposal threatens to further harm key fish species whose abundance is already dramatically declined. As I described in my written testimony on Page 4, the Biological Opinions that were issued in 2017 for the WaterFix proposed action contain

a long list of how WaterFix -- ways in which WaterFix could potentially harm salmon, Delta smelt, and other key fish species. The Biological Opinions acknowledged that there will be impacts to these key species but then rely on commitments to future uncertain adaptive management programs to somehow minimize or offset those adverse impacts. And that's -- I have an excerpt of that as -- Exhibit CCC-SC-6 has some excerpts from the Biological Opinions.

It is current state policy that Bay-Delta project should contribute to achievement of the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. And the WaterFix project will hinder that achievement of that goal.

The proposed -- the WaterFix proposed project will also degrade water quality in the Delta relative to the No Action Alternative, which is contrary to another State policy of achieving inherent objective of improving water quality to protect Delta health and the environment consistent with achieving water quality objectives in the Delta. And that's California Water Code Section 85020(e).

Could we have the next slide, please.

This slide shows Figure 10 from Exhibit DWR-514. And it shows simulated total South of Delta

deliveries to State Water Project and CVP contractors for a number of WaterFix alternatives.

The -- this was prepared prior to DWR moving to CWF H3+, so it's -- the alternatives that were in the Part 1 of the hearing. But if you look at Scenario H3, which is the light blue -- in about the middle, light blue bar, that does show that there could be improved water supply reliability as a result of the WaterFix project.

However, the State Board is currently considering implementing the 2010 Delta flow criteria that it developed as part of its Bay-Delta Water Quality Control Plan update. If the Board does proceed with increasing minimum flow requirements for inflow and outflow from the Delta, then the operating criteria on which the WaterFix will be operating in the future will be much closer to the Boundary 2 simulation, which is the bar on the extreme right of each of the sets of bars, medium gray color.

And you can see in all of the cases that Boundary 2 actually has much less water supply reliability than under the No Action Alternative. So if this likely future scenario does come into fruition, then the WaterFix project will also fail to achieve the other coequal goal of providing a reliable water supply

for California.

So if you consider the three things that I've talked about -- restoring the ecosystem, improving water quality in the Delta, and improving water supply reliability, the WaterFix project as currently proposed is zero to three and so really is not in the public interest. There are other alternatives that should be considered that would help achieve each of those goals.

Next slide, please.

The next slide is just a map of various locations in the Delta that were talked about in my testimony. I won't go into it in detail, but we may need to come back to it if someone is concerned about where a particular location is.

Next slide, please.

What I'd like to talk about at this point is the idea of a big gulp/little sip. Back in the start of the BDCP, there was a number of planning principles developed. And one of them was to -- that the project should capture more water during wet periods and reduce exports during dry periods, when the Delta ecosystem is more vulnerable.

And that does seem like a great idea. And there's been a number of references in papers and various presentations by the project proponents about

the big gulp/little sip, and it is quite a selling point for the project.

However, if you look at the project in much more detail, you find that it doesn't necessarily comport with that concept. In fact, it goes in the opposite direction in a number of cases.

So this slide, Slide 4 of my PowerPoint, which is from Contra Costa County, Solano County Exhibit 11, Figure 1, shows the period October 1981 through September 1984. And each of these water years were considered wet years. And you can see that there's some very large Delta outflows during this period of time.

I'd like to say that I -- at this point and for the rest of my testimony the most recent version of the project that I'll be presenting in terms of the modeling data is WaterFix simulation of the Biological Assessment, which is now called BA H3+. So we did not have access to the most recent version of the modeling, the CWF H3+. So I went with what was most appropriate at the time.

So the winter of 1983, for instance, was extremely wet, very high outflows, up to 29,000 cubic feet per second, at least in the modeling studies. And under those circumstances, we would expect that'd be

great opportunity to take one of these big gulps, to take a lot of water. But if you look at January, February, and March of 1983, the exports are way low, about 50 percent of what the capacity would be with the WaterFix project.

The capacity is about -- if you look on the right-hand side axis, it's about 14,900 cubic feet per second. And that's a combination of taking water in the South Delta and then taking water through the North Delta intakes.

If you -- pass to the next slide, please.

And if you look again, I've replotted the export data for this period of time. And if you look, I've also plotted the San Luis Reservoir storage. And at the time, when the Delta outflow was very, very large, at the beginning of 1983 -- January, February, March -- the exports drop off for some reason. And the reason -- the major reason is that the San Luis Reservoir was full.

So in this particular case, we're not able to take a big gulp because the WaterFix project does not include any additional storage South of the Delta to allow you to capture. It's constrained by the fact it can't move any more water south because there's nowhere to use it. And during wet periods, there's not much

demand for it anyway because the fields are already wet.

If we can get to the next slide, please.

I just put this one together. It's always interesting. There's been some discussion already in this hearing in Part 1 and other parts about whether permitting the WaterFix project will increase the capacity or the quantity of water that can be exported.

And if you're paranoid, then you could look at the left-hand side of that graph and say, if you add up all those diversion numbers, the maximum diversion capacity is 23,900, which is a lot of capacity. But in fact, it is constrained by how much water could then be moved South of the Delta beyond the Jones Pumping Plant and the State Water Project Banks Pumping Plant.

But if you think in particular about the State Water Project diversion, then under the existing system, because of the Army Corps limits on inflow to Clifton Court, then they can pump about 6,680 cubic feet per second.

With the WaterFix project, then they could increase the capacity. They wouldn't be limited at the South Delta. They could take extra water through the North Delta intakes, and they could take about 10,300 cubic feet per second.

Next slide, please.

So this one is -- is designed to show that in fact the proposed project, instead of taking little sips and backing off Delta exports during dry periods, there's a number of times when, in fact, the Delta outflow is very low, as is the case shown here in August of 1941, where the Delta outflow is only 4,000 cubic feet per second, which is pretty much the minimum allowed under D1641. And yet the WaterFix project is taking much more than existing.

And the existing is the green line. And that represents the culmination or the addition of 6680, plus 4600 as Banks -- at Jones Pumping Plant. So that's about 11,280. This is pumping much more than that. In fact, it's almost to the maximum that will be capable of being pumped with the WaterFix project.

So here's an example of very little outflows. We should be backing off exports to protect the Delta ecosystem, and the WaterFix project is taking the maximum and more than an existing amount. So it is able -- permitting the WaterFix project would allow more water to be exported from the Delta.

Next slide, please.

I just put this slide in here just to summarize the idea of big gulp and little sip, that you

would expect, if you looked at the X-axis, that during periods of time when you have very high outflows, you would be looking for the WaterFix project to take as much water as possible.

Presumably at that time, there's lots of flow, so things like the E/I ratio would be easily met; the Delta outflow requirements would be easily met, so you'd take the maximum you could grab if you had somewhere to put it. But in fact, the example I gave you for January 1983 was actually submaximal, or below existing.

Similarly, at low outflows, you would expect -- August 1941, you'd expect there'd be a little sip situation where the exports would be less than existing so that we could protect the Delta ecosystem. But in fact, in this case, it was above that.

So if you show the next slide, please.

The next slide shows at all data for this particular run for Biological Assessment proposed action. And it shows again, just -- the previous slide was showing you, orientating you that, on the left-hand side little sips, less than existing; on the right-hand side, you'd be looking as much as possible to be above the green line, taking an extra gulp to improve California's water supply.

But in fact the period -- the area that I circled, you can see there's more than just one month. There's lots of months where Delta outflow is low, but exports are increased or the quantity of water exported is increased.

Next slide, please.

This is the same graph of exports versus outflow from the Boundary 2 example. And that's the one that's closest to representing situation with the State Board 2010 Delta outflow requirements -- rather 2010, sorry, Delta Flow Criteria report. And those flows in that 2010 report were found to be what was needed for -- in the Delta ecosystem for fishery protection if fishery protection was the sole purpose for which the waters were put to beneficial use.

So that gives us an idea of what we should be aiming for in terms of flows if we're trying to improve the Delta ecosystem.

As you can see there, under those particular conditions when that run was run, the exports were reduced, or it was difficult to export a lot of water when the outflows were low. And in fact, it does seem that, during the lowest outflows, the exports are low; and as the exports increased -- sorry -- outflows increased, the exports increased.

So I put a line in there. And that line is just something that later in my presentation and in my written testimony I suggested would be a good idea to enforce, essentially, or encourage the little sip concept by saying when Delta outflows are very, very low, we want to encourage that the exports are reduced, in fact reduced.

And so something like a requirement where the total exports were limited to 1.5 times the Delta outflow, which is what that line represents, that would then get us into a situation where we would have regularly or consistently a little gulp.

Next slide, please.

One thing that is a theme in my written testimony is that, if we do a lot of long-term averaging and only present long-term averaging results, we don't learn too much, or a lot of these sort of impacts that I was showing you there are masked.

So what we want, would prefer to have is that we have data that are a bit more detailed in these kind of presentations to yourselves, when you're making a decision. So it's not good enough that the data are just accurate using good models. The data have to be actually usable, that you can actually look at the data and say, "Ooh, here's something we need to correct

through a permit term," or not. And you don't get that if you get a 16-year or an 82-year average.

Another thing that comes out of looking at the data in detail rather than long-term averages is, if you plot the flows, the model flows for the Biological Assessment proposed action -- these are the monthly flows because it's a monthly CalSim model. If you look at some of these models plotting the flows at Freeport above the North Delta intake for the Biological Assessment H3+ run and plot it versus the No Action Alternative, the points above the line are times when the California WaterFix would actually increase flows in the Sacramento River above the North Delta intakes, but you see there are a lot of points there below the line, the blue line, the 1-to-1 line, where the project is actually decreasing flows into the Delta above the North Delta intake.

And obviously it's clear to everybody that, if you take water out of the Sacramento River at the North Delta intakes, you're going to reduce the flow below the Sacramento -- below the North Delta intakes. But what wasn't clear and what hasn't really been clearly disclosed in the modeling and in the presentations is that there's also a time when the upstream operations will end up reducing the flow into the Delta. And this

could be a concern in terms of the fish.

And I know there was some discussion in Part 1 through cross-examination of -- that they -- there's going to be no change in the operating criteria of the projects upstream of the Delta, but that doesn't mean that there's not going to be a change in the flows coming into the Delta as a result of the project.

Next slide, please.

This one I had in my presentation because I was dealing with the Biological Assessment alternative and looking at the previous alternatives in Part 1. But since that time, DWR has changed the way they operate in October and November by taking away a requirement for OMR being minus 5,000 cubic feet per second.

So what has happened now, if you did a similar plot using the new set of data, then both sets of data would pretty much line-up, and you wouldn't get these exaggerated outflows in October which were causing the project to simulate lower salinities than we would expect in reality.

If you'd go to the next slide, please.

So this is what happened, for instance, in October, if you had unrealistically high flows in October and you compared the with-project salinities --

these are daily salinities for the month of October at Collinsville with the No Action Alternative, you see a lot of the points are below the line, meaning that the high flows, the unrealistically high flows, kept the Delta artificially fresh in October.

Next slide, please.

This is the plot of the data for September in which these unrealistically high flows didn't occur because it was prior to October. And you can see that they're -- the project is, if you're looking at individual months rather than long-term averages, we are getting a degradation of -- in the case of the Biological Assessment modeling but, as we'll show in our rebuttal, also in the current version of the model.

Next slide, please.

This project -- this plot I wanted to show for a couple of reasons, that DWR, for some reason, has been presenting only 16 years of water quality data and averaging it. And yet the CalSim runs are for the full 82 years. And in fact, now, more recently, they have been making available 82 years of water quality data, both for that Biological Assessment alternative and now for the CWF H3+. So these are from the Biological Assessment, the data that I had prior to November 30th of last year.

So what -- it's an easy way to check whether there's any difference between just presenting 16 years or data or 82 years of data. And so this just shows the change in water quality in terms of EC at Old River at Bacon Island. And you can see in March, if you do 82 years of data, even though it's a drier -- sorry -- it's a wetter period, the water quality impact in this case turns out to be larger, much larger than for the 16 years.

And so if you're only reading and making your decision on 16 years of data, then those impacts are being underestimated. And what's strange in this particular example here, if you look at November, there's a benefit in November of the project, or at least there was until they took away the unrealistically high flows in October, November.

But by taking 82 years, the benefit is actually -- is less than what would have been presented to you as a 16-year average improvement. So in this particular example, taking 16 years underestimates the impacts, adverse impacts, and overestimates the benefits.

Next slide please. Maybe I'll just skip this one and go to the next slide, please.

Another thing, it's a problem with long-term

averaging of data is that, if you're not presenting the daily data and just doing long-term averages, you just end up with a couple of points. And in fact they -- a purple -- oh, sorry. The blue diamond and the square, brown square, are the 82-year and the 16-year averages. And they look fine down there. The salinities are not that high as a long-term. And you think, fine, we must be doing well in terms of meeting the State Board's D1641 standards.

However, if you look at individual days within that data set, a lot of those data points are going well beyond the 250 standard. And the 250 standard milligrams per liter chloride is important because Old River at Bacon Island is very close to the entrance to Rock Slough, which is where the water supply goes -- comes from is it appears at Pumping Plant No. 1, where the State Board has its M and I standard of 250 chloride.

So if you're not able to meet 250 chloride at Bacon Island, you're not going to be able to meet the Delta Water Quality standards, the D1641 standards.

So really all I want to show with this one -- I know it's a complicated graph, and I don't want to blow the Hearing Chairs' minds on this one.

CO-HEARING OFFICER MARCUS: Marks she can

handle it. It's my mind.

WITNESS GRANBERG: But it is an issue that, if you're trying to do modeling that's showing how the project will operate in the future and the project is supposed to be operating to 250 milligrams per liter every day, then you'd better make sure that your Bacon Island EC is the equivalent or less of 250 chlorides.

So there is a problem with the modeling of water quality in the -- for the WaterFix project. There's been some discussions about these; some of these some of these are outliers, et cetera. But you can see there's a lot of data points, a lot of days of data that are well beyond the 250 standard. So this is also of concern.

Next slide, please.

Is that 40 or --

CO-HEARING OFFICER DODUC: How much time did you need to --

WITNESS DENTON: I'm getting pretty close, actually, I think. Yes, just another --

CO-HEARING OFFICER DODUC: Five, ten minutes?

WITNESS DENTON: Yes.

CO-HEARING OFFICER DODUC: Let's give you that.

WITNESS DENTON: I think this came up in cross-examination, but because the State Board has prepared a 2010 Delta Flow Criteria report, which is proposing to set standards based on percentages of unimpaired flow, it would be appropriate for the proponents of this project to present a result saying, well, how is their project doing in terms of meeting the January-through-June 75 percent of unimpaired flow criteria.

And what I did in this is referred to it in my written testimony as an example, illustrative example, because there aren't really -- I wasn't able to get hold of some unimpaired flows adjusted for global climate change. So I just used the existing unimpaired flows. But you can see that the percentages of unimpaired flow during the critical January-through-June period are way below 75 percent.

Next slide, please.

So what I'd like to say is that Contra Costa County and Solano County are concerned about this project, oppose the project in its present form. But if you are proposing to go ahead with it, then we would like you to consider these principles for developing permit terms. For example, setting specific limits on the operation of the project. If the project is

modeled and designed for a 9,000 cubic feet -- cfs intake or tunnels in the North Delta then, that should be a permit term saying that, if you suddenly drop in some extra pumps later on, you need to come back to us to get permission to move more than 9,000 cfs through there.

And similarly, if there's been some modeling that's been done with certain permit terms in there, like the Rio Vista standard, then that needs to be a mirror of a permit term or somehow the modeling needs to be redone because we want to be able to know that the modeling that's presented here does represent how the project will operate in the future.

I've suggested and my Point No. 2 here was just saying that maybe we need a permit term like "total exports is no more than 1.5 times the Delta outflow" so that we don't -- we can take a little sip during dry periods.

Another permit term I suggested is that because the project proponents want to get ahead of your process for setting new water -- new flow standards in the Delta based on the 2010 Delta flow criteria, then perhaps you can set a permit term that would say, "Okay. You can go ahead and build the project. You can build the tunnels, but you aren't

able to operate them unless the flows in the Delta are meeting those particular standards." And it doesn't mean that the DWR and Reclamation are required to meet those flows but that they can't operate this new facility unless it's consistent with what you are looking at in the 2010 Delta Flow Criteria. Obviously, once you've completed your water quality control update, that will no longer be needed.

And then I'm not sure how you would do this, but you need to look at the problem that the project is -- does seem to be reducing Sacramento inflows to the Delta. And then also, if the -- that you would require new -- that we start over, basically, if there's some changes to CVP and State Water Project systems, such as additional reservoir storage south of the Delta that would allow them to use the WaterFix facilities more often and with greater capacity.

And the last slide, please.

Just in conclusion that we maintain that the project in its current form is not in the public interest because it fails to meet the coequal goals and contribute to improving water quality in the Delta.

No. 2 is now moot, I guess, because of the new version of the project. And unless new modeling has completed, then you will not have the basis to make a

properly informed decision about key hearing questions because you will not have been presented enough data in a useable form to make those decisions. And I'd ask you to pay consideration to the permit terms I suggested.

Thank you.

CO-HEARING OFFICER DODUC: Thank you, Dr. Denton.

Mr. Keller, does that conclude your direct?

MR. KELLER: Concludes the direct testimony, and Dr. Denton is available for cross-examination.

CO-HEARING OFFICER DODUC: All right. Before we take our break, let me make sure I have it right. We have Department of Water Resources, then Mr. Bezerra, Mr. Herrick, Mr. Jackson, and Ms. Des Jardins planning on conducting cross-examination.

All right. With that, let's go ahead and take our afternoon break, and we will return at 4:15.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. It's 4:15. We're back. And before we turn to Mrs. Ansley for cross-examination, let's do some -- or at least try to do some planning for tomorrow. If we're not able to finish and dismiss Dr. Denton today, we'll resume with him tomorrow. But I expect we will get to Group 31

CSPA, CWIN and Aqua.

Mr. Jackson, how are your panels looking for tomorrow?

MR. JACKSON: The Panel No. 1 will be here at 9:30 to begin. Panel 2 will be here at 9:30 to follow them. Panel No. 3, I have told -- because they have to come from the north state -- that I thought it was going to be Wednesday morning. But today has gone a little faster than I thought it would.

CO-HEARING OFFICER DODUC: So let's do some time estimates for your Panels 1 and 2. How much do you anticipate needing for direct?

MR. JACKSON: I told each panel member on Panel 1 that they had 20 minutes.

CO-HEARING OFFICER DODUC: So 20 times five --

MR. JACKSON: There's five of them, so.

CO-HEARING OFFICER DODUC: Okay. So we'll make that roughly an hour and 15 minutes.

And how much cross-examination do you anticipate for Panel 1?

MR. MIZELL: Tripp Mizell, DWR. We anticipate one hour cross for Panel 1.

CO-HEARING OFFICER DODUC: Anybody else anticipating cross for Panel 1?

MR. KEELING: Tom Keeling for the San Joaquin

County protestants. I anticipate about 20 to 30 minutes.

CO-HEARING OFFICER DODUC: Okay.

MR. HERRICK: John Herrick, South Delta parties. Mr. Dean Ruiz will be here, but I believe it will be 25 to 30 minutes of cross.

CO-HEARING OFFICER DODUC: All right.

MS. DES JARDINS: Deirdre Des Jardins, 30 to 45 minutes.

MR. EMRICK: Matt Emrick, City of Antioch, approximately 10 minutes.

CO-HEARING OFFICER DODUC: Okay. So if I do my math correctly -- and I am an engineer --

MR. JACKSON: From Cal.

CO-HEARING OFFICER DODUC: Yes, from Cal, even.

That's almost five hours if we consider a break in between. So I think it's probably safe that we won't get to your Panel 3. But, speaking of Panel 2, direct for Panel 2?

MR. JACKSON: I will imagine that it would be shorter. There's four of them. It's my recreation, fishing, yachting --

CO-HEARING OFFICER DODUC: 20 times 4?

MR. JACKSON: Yeah.

CO-HEARING OFFICER DODUC: And cross for DWR?

MR. MIZELL: I anticipate 40 minutes of cross.

CO-HEARING OFFICER DODUC: Any other cross?

MR. EMRICK: Matt Emrick, City of Antioch, approximately 15, 20 minutes for Panel 2.

CO-HEARING OFFICER DODUC: Okay.

MR. HERRICK: John Herrick, South Delta parties, probably 15 to 20 minutes for that Panel 2.

MS. DES JARDINS: Deirdre Des Jardins, 30 minutes.

CO-HEARING OFFICER DODUC: And that's roughly three hours for your Panel 2. So, no, we will not get to your Panel 3 until Wednesday.

MR. JACKSON: Thank you. They will be here at 9:30 on Wednesday morning.

CO-HEARING OFFICER DODUC: All right. Any other housekeeping matter we need to attend to?

(No response)

CO-HEARING OFFICER DODUC: Seeing none, all right. I will now turn it over to Ms. Ansley and Mr. Mizell.

MS. ANSLEY: We were busy checking your math. Kidding.

CO-HEARING OFFICER DODUC: I'd love to be wrong if you get a smaller number.

CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: Good afternoon, Dr. Denton. My name is Jolie-Anne Ansley with the Department of Water Resources.

WITNESS DENTON: Good afternoon.

MS. ANSLEY: If we could call up your testimony, which is CCC-SC-3 -- do you have a copy in front of you?

WITNESS DENTON: Yes, I do.

MS. ANSLEY: And it's also going to be on the screen, so any time you need a moment, let me know.

So if we can go to the bottom of Page 3. On the bottom of Page 3, I realize we're looking at an incomplete excerpt, but you see your Line 26, where your recommendation is that the modeling data must be revised?

WITNESS DENTON: Right.

MS. ANSLEY: Did you conduct any modeling to make the suggested revisions?

WITNESS DENTON: No, I didn't.

MS. ANSLEY: Which brings me to some sort of overarching questions. It's my understanding that you do not perform any independent modeling of the California WaterFix; is that correct?

WITNESS DENTON: That's correct.

MS. ANSLEY: So you used model outputs generated by the Department of Water Resources to generate the graphs that we saw today in your case in chief?

WITNESS DENTON: Yes.

MS. ANSLEY: So you -- just to make sure that we're speaking the same language, and that's a me problem.

So you performed no modeling runs that would generate output?

WITNESS DENTON: No.

MS. ANSLEY: Okay. And no spreadsheets manipulating data?

WITNESS DENTON: Well, converting EC-to-chloride and converting cfs into thousand acre-feet those kind of things.

MS. ANSLEY: What was the second one? You said "EC-to-chloride first."

WITNESS DENTON: EC-to-chloride. And then, if you're doing -- I would prefer to present export data in terms of cfs, but obviously sometimes people prefer to have it in thousand acre-feet or something like that. So you have to do those kind of conversions.

MS. ANSLEY: In your testimony, did you disclose the formula that you used for your

EC-to-chloride conversions?

WITNESS DENTON: Yes, I did. It's -- see if I can find it.

MS. ANSLEY: Would you? Thank you.

WITNESS DENTON: DWR-509. I think I referred to it there in my testimony. It's actually a memo that I wrote many times ago, but it was one of your exhibits. But it was using the seawater intrusion conversion from EC-to-chloride.

MS. ANSLEY: And you said that was DWR-509, exhibit --

WITNESS DENTON: 509, I think I've got it right.

MS. ANSLEY: Yeah.

WITNESS DENTON: And it is mentioned in my testimony.

MS. ANSLEY: Thank you. And do you have a spreadsheet of those calculations?

WITNESS DENTON: Sure. For which --

MS. ANSLEY: Just in general. I assume you kept your --

WITNESS DENTON: Yeah.

MS. ANSLEY: -- your conversion calculation.

And similarly, you have your conversions from cfs to thousand acre-feet, which I understand is a very

simplistic conversion.

WITNESS DENTON: Right.

MS. ANSLEY: Would it be possible for us to obtain those spreadsheets? And here I'm also asking your attorney.

MR. KELLER: We can provide that.

MS. ANSLEY: Thank you.

WITNESS DENTON: If you can narrow it down to which run -- because I looked at B1 through B2 and everything. But maybe you're just interested in the Biological Assessment one?

MS. ANSLEY: No. I do understand how I focused first on this testimony. I'm interested in your -- should you have a workbook, I'm interested in all your calculations that support your Part 2 testimony here as CCC-SC-3.

WITNESS DENTON: Okay.

MS. ANSLEY: Thanks.

WITNESS DENTON: Yes, so the spreadsheet that produced the graphs is basically what you're saying?

MS. ANSLEY: Yes, whatever supports your results.

WITNESS DENTON: Okay, sure.

MS. ANSLEY: Thank you.

So on Pages 5 to 6 of your testimony, on Lines

24 to 26, you state that the U.S. Fish and Wildlife Service and the National Marine Fish Service Biological Opinions contain a mix of standard level and programmatic level project elements. Do you see that?

WITNESS DENTON: Yes.

MS. ANSLEY: Just to make sure we're looking at the right part of your testimony.

Isn't it true that the National Marine Fisheries Service Biological Opinion reviewed operations of the California WaterFix at a project level and provided an Incidental Take Permit?

WITNESS DENTON: I'm not certain. I couldn't swear to it, but I understand that is the case. I was quoting directly from the two Biological Opinions saying that they were saying that they addressed it at both those levels.

MS. ANSLEY: And then looking on Page 6, Lines 4 through 19, and specifically Line 17 through 19, you state that the -- that the impacts here, specifically the winter-run Chinook salmon, are addressed in the future by as-yet unknown and unapproved adaptive management actions. Do you see that?

WITNESS DENTON: Yes.

MS. ANSLEY: In your experience, isn't it true

that the Water Board has issued water rights permits that include conditions requiring the permitee to abide by the Endangered Species Act?

WITNESS DENTON: That rel- -- sure, yes.

MS. ANSLEY: And is it your understanding that sometimes these conditions encompass future, as-of-yet prescribed [sic] operations or actions that the project will have to take?

CO-HEARING OFFICER DODUC: Hold on, please.

Mr. Bezerra.

MR. BEZERRA: Yeah, objection, vague and ambiguous. We're talking about apparently multiple unknown permits with multiple unknown permit terms. I don't know what the question actually concerns.

MS. ANSLEY: I'm not asking for a specific permit as of yet. I will get there. I'm asking for his general understanding of permit conditions that he has seen in water rights permits in his experience.

CO-HEARING OFFICER DODUC: All right. With that caveat.

WITNESS DENTON: Well, in terms of the Los Vaqueros project, for instance, the Biological Opinion permits and the State Board's permits were very specific. So they really didn't include a vague adaptive management term at that point.

MS. ANSLEY: And the Los Vaqueros project, that permitting was in Water Board Decision 1629?

WITNESS DENTON: '29, yes.

MS. ANSLEY: Mr. Hunt [sic], can we look at 1629? It's on my thumb drive.

And can we go to -- I think it's PDF Page 60. And can we look at Section 4.2. It's a little long.

Do you see here where the permit condition for the Los Vaqueros that was approved in Water Board Decision 1629 indicated that the National Marine Fishery Service and the U.S. Fish and Wildlife Service were authorized to revise from time to time the terms and conditions?

WITNESS DENTON: Sure. That's not adaptive management though. That's just setting in new terms.

MS. ANSLEY: I'm sorry. They're setting new terms?

WITNESS DENTON: Well, they're changing the terms. But it's not adaptive management by CCWU, for example. I thought your questions were more specific to CCD having adaptive management.

MS. ANSLEY: Is it your understanding under the adaptive management program for the CWF that the -- it would be the fisheries agencies who make decisions?

WITNESS DENTON: At this point, I haven't

looked into it in that detail specifically, who has voting rights. We were concerned about us, the counties having a seat at the table.

But I assume that the petitioners have a major role in saying what they want to do in terms of adapting their operations with guidance from the fishery agencies.

MS. ANSLEY: So you're not aware of the decision process laid out for the Adaptive Management Program proposed for the CWF?

WITNESS DENTON: I have read through it, but I don't know it in that sort of detail.

MS. ANSLEY: But isn't that essentially what you are critiquing here, in your testimony here in Part 2, future changes to project operation?

WITNESS DENTON: What I was alluding to there is that we've heard that the adaptive management range is from Boundary 1 through Boundary 2, which is a huge range of operating criteria. And that is a concern because we don't know whether in fact because of that adaptive management, you will be operating to Boundary 1 or maybe Boundary 2.

So the concern was raised and -- the concern that we don't know what those adaptive management actions are.

MS. ANSLEY: If we could look at Page 9 -- I think on Pages 9 and 12 of your testimony, if you want to confirm, you discuss your opinion that the Cal WaterFix will not be able to consistently capture new water during periods of high Delta outflow; is that correct?

WITNESS DENTON: Yes.

MS. ANSLEY: And you use water year 2017 as an example?

WITNESS DENTON: Historical water year, yes, not the modeling water year.

MS. ANSLEY: I'm sorry. Could you say that again? My --

WITNESS DENTON: Well, just, yeah, that is a historical event, 2017. This is now talking about the modeling.

MS. ANSLEY: Isn't it true that the California WaterFix proposes to capture wet events or wet precipitation events not necessarily correlated to wet years such as 2017?

WITNESS DENTON: And that was my point, too, that we should be talking about wet periods, like wet months, not necessarily wet years or dry years. Because within a wet year, you can have a dry -- you always have pretty much a dry fall, and vice versa.

You could have -- in a dry year, you could actually have a couple of weeks of wet weather. So that's when you should be capturing water if you do have a wet event of a couple of weeks or a month.

MS. ANSLEY: Wasn't 2017 the wettest year in the Sacramento River Basin?

WITNESS DENTON: Not sure about -- I would have thought '86, 1986 would have also been very wet.

MS. ANSLEY: I'm sorry. Say that again? I couldn't hear you.

WITNESS DENTON: 1983 and '86 were also very wet years. I haven't really compared how wet they were.

MS. ANSLEY: Is 1983 the wettest year in the CalSim -- the CalSim -- like the CalSim input years, the '82 years?

WITNESS DENTON: I'm not sure. I know 1986 had the largest Delta outflow, but that was just for, obviously, a couple of days.

MS. ANSLEY: Looking at Pages 15 to 16 of your testimony.

I'm looking at lines -- hold on.

I think I have the wrong line number. I'm sorry. I'm looking for your testimony where you discuss your opinion that the petitioners intend to

take advantage of their future ability to export up to 10,300 cfs when the Delta outflow is very low and the Delta ecosystem is vulnerable. Do you recall that testimony?

CO-HEARING OFFICER DODUC: Line 13?

MS. ANSLEY: Thank you. I'm sorry. I had that written down incorrectly. Yes, you're right, 13 to 16. Do you see that?

WITNESS DENTON: Yes.

MS. ANSLEY: By "vulnerable" do you mean a dry hydrologic period?

WITNESS DENTON: If you're referring to a period being a couple of weeks or a month, something like that, when Delta outflows are very low is the way I define it.

MS. ANSLEY: And what do you consider very low?

WITNESS DENTON: Well, the permit term I suggested, it was sort of -- until you get up to about 10,000 was where I thought that would be appropriate, then, to be able to take the full capacity of the WaterFix project. But with flows lower than that, especially when flows are just 5,000 4,000, then we should be trying to decrease exports instead of increasing exports.

MS. ANSLEY: Can we look at your Figure CCC-SC-17?

WITNESS DENTON: That's Exhibit 17?

MS. ANSLEY: Yes, sir, Exhibit 17.

WITNESS DENTON: Okay. Which figure?

MS. ANSLEY: This very first one, I believe. I think that figures -- yeah, I think Figure 1. Here you show combined exports, is that correct, for the proposed action?

WITNESS DENTON: Yes.

MS. ANSLEY: And you analyze 1941, and on the next page, you analyze 1983; is that correct as well? The next figure is 1941 and 1983.

WITNESS DENTON: Oh, well, that was just because when I was doing my big gulp example, I had used January '83. But the January '83 one is in a different location.

MS. ANSLEY: That's okay. I have a few questions about this -- the first graph here.

What is -- BA, PA, what's TEXP?

WITNESS DENTON: That's "total exports." My way of keeping it short. And there was a couple of mistakes in my graphs where I was referring to the project action rather than the proposed action, I think is the correct term.

MS. ANSLEY: Okay. But my understanding is that you used the BA H3+.

WITNESS DENTON: As it is now called, yes.

MS. ANSLEY: Project action, is that how you want to it?

WITNESS DENTON: Well, it's proposed action. When you go Biological Assessment, you refer to it as proposed action.

MS. ANSLEY: All right. I'll try and keep my terminology clear. Do you know whether the -- under the CWF modeling or the BA modeling here, do you know whether the proposed action was meeting D1641 requirements in August of 1941?

WITNESS DENTON: I did have a look to see if it was -- what was controlling or tried to find what was controlling. But if it wasn't meeting D1641, that would be even more reason for not to be exporting that much. I did -- I looked in more detail at the other one because I -- the example of the big gulp because I was concerned that maybe exports were reduced because of some Delta control. But in fact, they weren't.

But in this case, I didn't really need to do it because if you weren't meeting D1641, you shouldn't have been pumping that much anyway.

MS. ANSLEY: What is the year type for 1941?

Or why did you choose 1941? Let me ask you that first.

MS. ANSLEY: I just -- the Figure No. 4, I just look at that, and there's obviously a lot of points that are above the line. And I just thought I'd find an example of one. And that seemed to be a good one because the exports were at a maximum and the outflow was the lowest of the data points.

So I was just trying to show an example where it would be very clear to the Board that this was a very vulnerable situation with a very low Delta outflow and yet we were going to the maximum pumping.

MS. ANSLEY: Isn't the outflow -- can we agree, looking at sort of the low point in the middle of the graph in the blue line, can we agree that's about around 4,000 cfs?

WITNESS DENTON: I think it's exactly 4,000 because it's controlled by D1641.

MS. ANSLEY: Right. And is it your understanding that 1941 was a wet year?

WITNESS DENTON: I'm not sure what year it was, but my point in all of this is that we should be thinking in terms -- we obviously have to set standards by water year types, et cetera. But in terms of the ability to capture water or to back off on capturing water, we should do it on a month-by-month basis

instead of a year-by-year basis.

MS. ANSLEY: Well, I think, isn't -- my next question, looking at your arrow that says "August 1941," it says this is a wet year -- and I'm happy to pull up the CDEC if you would like. Isn't the net Delta outflow for August of that wet year 4,000 cfs?

WITNESS DENTON: That's what the modeling says.

MS. ANSLEY: And is that the regulatory requirement?

WITNESS DENTON: September-October, I'm not sure in terms of it's not the fall outflow requirement.

MS. ANSLEY: No, the fall outflow requirement, that would be in October; is that correct?

WITNESS DENTON: Yeah, it's in general October, November, December. So it's not being controlled by the Rio vista standard.

MS. ANSLEY: Do you think that that dip in about September -- or I guess it would be October in 1942, where you see your export line then dip down to about just below 4,000, would that be the pulse flow, the fall pulse flow?

WITNESS DENTON: Sorry. Which one are you talking about, August 1941 or October?

MS. ANSLEY: From August 1941, I'm following

the red line down to the point sort of -- you see how it comes to a point around just below 4,000?

WITNESS DENTON: Yeah.

MS. ANSLEY: Would that be the pulse flow?

WITNESS DENTON: So that's you cutting back on exports because of the pulse flow, you say?

MS. ANSLEY: I'm asking you, is that the fall pulse flow?

WITNESS DENTON: I'm not sure what that's for. And that has now changed, I assume, because of the new requirements for October and November in the CWF H3+.

MS. ANSLEY: Can we look at your figure, same Figure 17 or Exhibit 17. Can we look at -- I guess it's Figure 3, the next figure after this.

And I have sort of the same question for this figure, Figure 4, I guess Figure 5. You have a cut-off here of 35,000 Delta outflow. Is there a reason you cut it off at 35,000?

WITNESS DENTON: Yes, because these were looking at the little gulp -- little sip situation. If I was trying to present these data to explain what was happening in terms of large gulps, then I would have to obviously show much higher outflows to see if they were going above the line to very high outflows situation.

If you try and expand the graph too much, then

you don't get the detail about what's going on at the very low outflow.

CO-HEARING OFFICER DODUC: About how much more time did you need, Ms. Ansley?

MS. ANSLEY: You know, I'm just looking because I am going to skip a couple lines of questions So give me a second; I might be down to my last few questions.

CO-HEARING OFFICER DODUC: Okay.

MS. ANSLEY: Thank you.

I think can I move to my last question. Can we look at Page 26 of your testimony, on Lines 14 through 17. Thank you.

And here I believe you're offering a conclusion that operations and water quality impacts are not analyzed, are not representative of future water project operation?

WITNESS DENTON: Correct.

MS. ANSLEY: And in particular in this first paragraph at Lines 13 to 22, you offer the opinion that the climate change modeling is not representative of future conditions because the year 2025 is only eight years away?

WITNESS DENTON: Yes, that's what it says.

MS. ANSLEY: Are you familiar with the early

long-term scenario from the Cal WaterFix modeling?

WITNESS DENTON: That is the -- 2025 is the early long-term, right?

MS. ANSLEY: Yes. Isn't it true, though, that the early long-term analysis timeline includes regional climate change projections for a 30-year climatological period, which in this case ends at -- runs through 2040?

WITNESS DENTON: That's not my understanding. I thought that it was centered around 2025, 2030, and that the late long-term was 2060. I didn't realize it was I didn't realize it was variable over that time.

(Reporter interruption)

WITNESS DENTON: Sorry. I didn't realize it was varying. I thought if you set a climate change scenario, you set it for a particular year and then do the modeling for that year.

MS. ANSLEY: Okay. I have no further questions. Thank you, Dr. Denton.

CO-HEARING OFFICER DODUC: Mr. Bezerra.

Mr. Herrick just said you needed a few minutes, so I interpret that to be two.

MR. BEZERRA: Well, I was thinking it was about 15.

CO-HEARING OFFICER DODUC: All right.

Mr. Herrick was just slightly off. Actually, no, I think he did say 15.

MR. BEZERRA: I appreciate Mr. Herrick helping me out earlier today, whatever he may have said. And thank you very much.

CROSS-EXAMINATION BY MR. BEZERRA

MR. BEZERRA: Dr. Denton, my name is Ryan Bezerra. I represent the cities of Folsom and Roseville, Sacramento Suburban Water District, and San Juan Water District.

Could we please pull up Dr. Denton's PowerPoint, which is CCC-SC-1. And go to Slide 4, please.

Okay. Dr. Denton, as I understand this slide, it depicts essentially South Delta exports and Delta outflow for a period in the modeling over roughly three years, correct?

WITNESS DENTON: Yes.

MR. BEZERRA: And if I could --

WITNESS DENTON: Yes.

MR. BEZERRA: Okay. So it's the entirety of that three-year period that's depicted for these results in this slide?

WITNESS DENTON: Yes.

MR. BEZERRA: Now, are you aware that

primarily we viewed modeling results in exceedance graphs in this hearing?

WITNESS DENTON: Yes, and long-term averages.

MR. BEZERRA: What is it that you believe that a three-year plot like this tells you that an exceedance graph would not?

WITNESS DENTON: Well, especially with exceedance graphs, the problem with those is you sort them by ranking in terms of size or something like that. And so often you find that a 50 percent exceedance of flow doesn't correspond to the same period of time when the 50 percent exceedance of exports occur. So you lose a lot of detail by doing exceedances; whereas something this, if we're trying to focus in on periods of time when there's a large outflow and you're trying to take an export off, you need to look at something with more detail.

MR. BEZERRA: So that would tell you potentially, on a practical basis, how the projects might operate in the same conditions with and without the tunnels, correct?

WITNESS DENTON: Well, this is really showing how they propose to -- when I say "propose to operate," I'm saying that's what they modeled, so that's what they must propose to operate, how they must propose to

operate. And it's saying that, during that particular example, when there's a huge outflow, they're going to cut back on exports and lose the opportunity to capture water.

MR. BEZERRA: Okay. Thank you.

Could we please now go to CCC-SC-28.

It's Figure 5, so Page 5.

WITNESS DENTON: Oh, Figure 5.

MR. BEZERRA: And this is the one that you were -- you said you didn't mean to blow the Hearing Officer's mind, but I'm afraid you did kind of blow mine with this one. So I need to try to understand what's depicted here.

CO-HEARING OFFICER DODUC: We've decided it looks like Dr. Octopus.

MR. BEZERRA: Yes, the Doc Oc graph, yes.

So I initially want to be sure I understand what this is showing. So on the Y axis, PA Bacon Island EC, going up that, right up that axis, that is EC modeling results at this location for the proposed action, correct?

WITNESS DENTON: Yes.

MR. BEZERRA: Okay. And then if you go on the Y axis [sic] that's the same parameter but for the no action, correct?

WITNESS DENTON: Yes.

MR. BEZERRA: Okay. Now, you have the dashed red lines, and for both the Y axis and the X axis, that line represents a water quality objective from D1641, correct?

WITNESS DENTON: Yes, an M and I standard at a location immediately adjacent to Old River at Bacon Island.

MR. BEZERRA: Okay. So if we're just looking strictly at the Y axis, anything that is above that dark red line as you might extend that dashed red line all the way to the right --

WITNESS DENTON: Yes.

MR. BEZERRA: -- that would be a modeling result that would violate that water quality objective for proposed action, correct?

WITNESS DENTON: With the condition that there is no M and I standard at Old River Bacon Island. It's a little further away. But if you're exceeding it there, you're going to exceed eventually at Rock Slough.

MR. BEZERRA: Okay. So --

WITNESS DENTON: Operating, you need to stay below 250 at Bacon Island.

MR. BEZERRA: So even if we completely ignored

the X axis, on the Y axis, the dots that are above the dashed red line are modeled violations, essentially, of a water quality objective?

WITNESS DENTON: Exactly.

MR. BEZERRA: Thank you.

Now could we please go to Dr. Denton's testimony, which is CCC-SC-3, and Page 33 of that testimony. And specifically, Lines 14 -- well, specifically Line 7.

Okay. Now I'm going to speak in generalities a little bit here. Dr. Denton, in this part of your testimony, you're discussing that EC modeling result we just reviewed, correct?

WITNESS DENTON: Yes.

MR. BEZERRA: Okay. And I believe what you're saying is that, because the modeling shows many violations of the water quality objective, it's not particularly realistic modeling, correct?

WITNESS DENTON: Yes.

MR. BEZERRA: Okay. Now if we can go to Page 14 [sic], it says, "In real-time operations of the Delta by the SWP and CVP project operators, the 250 milligrams per liter would be met by, among other things, increasing Delta outflow." Do you see that?

WITNESS DENTON: Which line is that, sir?

MR. BEZERRA: 14 through 15. I'm sorry. We should be on Page 33.

WITNESS DENTON: I thought you said 14.

MR. BEZERRA: I apologize. Line 14. I may have misspoke.

WITNESS DENTON: So that's on Page 33?

MR. BEZERRA: Page 33, Lines 14 through 15. I just read that sentence. I can read it again if you like.

WITNESS DENTON: Right.

MR. BEZERRA: Okay. So you say that standard would be met by, among other things, increasing Delta outflow.

What would be the other things that might result in compliance with that standard?

WITNESS DENTON: Sometimes they just reduce exports so that the outflow increases because less water is being exported.

MR. BEZERRA: Okay. Are there any other means by which the Central Valley Project and the State Water Project could increase Delta outflow in order to meet that water quality standard?

WITNESS DENTON: Other what? Sorry?

MR. BEZERRA: Could they release water from upstream storage?

WITNESS DENTON: Right. And that -- yeah, that would then increase Delta outflow.

MR. BEZERRA: So increasing water -- increasing releases from Delta outflow would be a means to meet that water quality objective?

WITNESS DENTON: Right.

MR. BEZERRA: Okay. So could we please go back to CCC-SC-28, Figure 5? Thank you.

So, again, back to this graph. So on the Y axis, Dr. Denton, those violations on the proposed project, the projects could attempt to bring those into compliance by releasing more water from upstream storage, correct?

WITNESS DENTON: If there was persistent exceedance of 250, yes.

MR. BEZERRA: Okay. And are you aware that the Central Valley Project often releases water specifically from Folsom Reservoir to attempt to meet Delta water quality objectives?

MR. BEZERRA: Yes, I am.

MR. BEZERRA: And is that because Folsom Reservoir is the closest reservoir to the Delta?

WITNESS DENTON: Yes, you get much quicker response to the...

MR. BEZERRA: Okay. So does this graph

indicate that more realistic modeling could show that the projects would release more water from Folsom Reservoir in order to try to meet the applicable water quality objectives with the project?

WITNESS DENTON: That's one possibility. And that was my concern is that, if you had modeling like that, then in real life they'd do different operations which would then have different impacts on people than was actually modeled.

MR. BEZERRA: So if we could please go back to Dr. Denton's testimony, CCC-SC-3, Page 33 and Line 14, you see there where it discusses in real-time operations, Dr. Denton?

WITNESS DENTON: Yes.

MR. BEZERRA: So is one possibility that, as a result of this project, in real-time operations, the projects might release more water from Folsom Reservoir than has been depicted in the modeling?

WITNESS DENTON: I think it would be fairer to say that there would be different releases because there might be more in one month and then the next month less. But it will change from what we've had presented to us once those exceedances are corrected.

MR. BEZERRA: So if we correct the exceedance of Delta water quality objectives depicted in the

modeling, that might result in more draw on Folsom Reservoir in some months than has been depicted in the modeling?

WITNESS DENTON: It could do that, or it could mean that the petitioners are able to export more water.

MR. BEZERRA: Okay. Thank you very much.

CO-HEARING OFFICER DODUC: Thank you, Mr. Bezerra. Very efficient.

Mr. Herrick.

MR. HERRICK: Thank you. Once again, John Herrick for South Delta parties. It will not take me 20 or 30 minutes.

CROSS-EXAMINATION BY MR. HERRICK

MR. HERRICK: Dr. Denton, your testimony includes references to whether or not the proposed project will meet the coequal goals of the Delta Protection Act, correct -- or the Delta Reform Act?

WITNESS DENTON: Delta Reform Act, yes.

MR. HERRICK: And One of those goals is improving the ecosystem of the Delta, correct?

WITNESS DENTON: Yes.

MR. HERRICK: And according to your testimony, since the project will decrease water quality, it then necessarily doesn't help improve or restore the

ecosystem; is that correct?

WITNESS DENTON: Sorry. Could you repeat the question?

MR. HERRICK: Your testimony indicates that, since the project decreases water quality -- and you referenced the Section No. 85020E. . .

WITNESS DENTON: I was treating that as two separate things. At certain times, it's going to impact fish, which is not improving the ecosystem. And at other times, maybe overlapping, it also degrades water quality.

MR. HERRICK: And what I meant to ask was, then, because of those impacts, you conclude that it's not helping to address one of the coequal goals.

WITNESS DENTON: Yes.

MR. HERRICK: And then the other coequal goal was reliable water supply, correct?

WITNESS DENTON: Yes.

MR. HERRICK: And although there are scenarios it might help improve water supply reliability, you raised the question that adaptive management actions may result in the water supply going down and thus the reliability may be affected?

WITNESS DENTON: Are you referring to Boundary 2 or just adaptive management in general?

MR. HERRICK: Adaptive management in general.

WITNESS DENTON: The reason I talked about adaptive management in general is just it's an open blank check that we don't know how they're going to be operating it. It could well up, once the State Board approves it under those conditions, they could start operating going to Boundary 1 because that's within the range of adaptive management.

MR. HERRICK: So the adaptive management decisions ultimately might affect the amount of water export, correct?

WITNESS DENTON: Yes.

MR. HERRICK: And that goes to the issue of water supply reliability.

WITNESS DENTON: Yes. Now, adaptive management also might affect ecosystem restoration; is that correct?

WITNESS DENTON: Right. And obviously the idea would be to improve ecosystem restoration through adaptive management.

MR. HERRICK: And let's just assume that WaterFix is operating, and they've identified an adverse impact to fisheries that the Biological Opinions say should be addressed through adaptive management. Okay? Are you with me so far?

WITNESS DENTON: Yes.

MR. HERRICK: And then there's some sort of decision process about how to address that impact, correct?

WITNESS DENTON: Correct.

MR. HERRICK: And are you familiar with previous adaptive management efforts in the Delta?

WITNESS DENTON: For example?

MR. HERRICK: Real-time monitoring and decisions made on smelt take and red light, yellow light warnings, things like that?

WITNESS DENTON: Yeah, I followed some of the danger assessment team conference calls, things like that, where they made those on-the-fly decisions.

MR. HERRICK: And this those decisions, isn't it true that there's a tension between the need for exports and then a need for an action to protect fish in many cases?

WITNESS DENTON: Definitely.

MR. HERRICK: And do you know of any guarantee through the petitions that would say any time there's a need to take actions to protect fish, that that will prevail over export needs?

WITNESS DENTON: Not aware of that.

MR. HERRICK: So in fact, although the

Biological Opinions rely on adaptive management, we have no way to gauge whether or not the adaptive management will address the potential adverse impacts identified in those Biological Opinions; would you agree with that?

WITNESS DENTON: Yes.

MR. HERRICK: If we could pull up Slide 7 to your PowerPoint. I think that's CCC -- that one, Slide 7, please.

Dr. Denton, you see Slide 7 on the screen before you?

WITNESS DENTON: Yes, I do.

MR. HERRICK: Now, if exports under this modeling scenario -- this is a modeling scenario, correct?

WITNESS DENTON: Yes.

MR. HERRICK: If exports are high when outflow is low, what's the source of the high exports, or do you know?

WITNESS DENTON: Well, the source of high exports are inflow to the Delta. And it's just taking more inflow from the Delta and leaving less as outflow.

MR. HERRICK: And that inflow to the Delta could either be return flows or natural flows, or it could be storage releases, correct?

WITNESS DENTON: Correct, coming from the Sacramento side.

MR. HERRICK: And if it were storage releases, then that would indicate that water is being released from storage to allow for exports that are higher than what will be under natural conditions?

Or let me start again.

If it is in this hypothetical we're talking about, exports -- these high exports are based on storage releases, then that's decreasing storage for the following year's carryover, correct?

WITNESS DENTON: Under that scenario, yes.

MR. HERRICK: And it may not always be, but that's one of the possibilities?

WITNESS DENTON: Well, depends what -- you could get a large storm in October.

MR. HERRICK: Yes.

WITNESS DENTON: Or long after

MR. HERRICK: But it's either one of those; it could be a natural flow event, or it could be releases from storage, correct?

WITNESS DENTON: Right.

MR. HERRICK: Now, if it's releases from storage, that would mean that there would be less carryover to meet future water quality standards; is

that correct?

WITNESS DENTON: That would be correct.

MR. HERRICK: Dr. Denton, is it your position that the Board should first determine the amount of water needed to protect fisheries before permitting a project that sets export numbers?

WITNESS DENTON: I can't argue the legal case for it, et cetera, but it seems like the sensible thing to do is that we should design a project where you first say, "What do the fish need?" and then what particular facilities, like conveyance or South of Delta storage, would we then have to make sure that then we also can capture enough water to make the water supply side of things hold.

MR. HERRICK: Would another predetermination before determining exports be perhaps superior water rights?

WITNESS DENTON: Sorry, I didn't follow that.

MR. HERRICK: Your answer said that -- I think said that we first need to determine what's needed for the environment and fish and then design a project that would allow a certain amount and be authorized to a certain amount of exports, correct?

WITNESS DENTON: Right. And that would be then -- would be the amount of water that could be

exported would have to then take into account prior rights.

MR. HERRICK: That's all I have. Thank you.

CO-HEARING OFFICER DODUC: Thank you, Mr. Herrick.

Mr. Jackson. Mr. Jackson, do you anticipate needing the entire 30 minutes?

MR. JACKSON: I don't because a number of the questions have been asked.

CO-HEARING OFFICER DODUC: Okay.

Ms. Des Jardins? Do you -- have you been able to streamline your cross-examination?

MS. DES JARDINS: I removed a few, but a significant part of what I'm asking, nobody's asked.

CO-HEARING OFFICER DODUC: All right. Why don't we see how far we get with Mr. Jackson before we decide whether to adjourn with Mr. Jackson and start fresh in the morning with Ms. Des Jardins.

CROSS-EXAMINATION BY MR. JACKSON

MR. JACKSON: Good morning, Dr. Denton.

WITNESS DENTON: Good morning.

MR. JACKSON: Or afternoon. I'm sorry. It's getting to be like that.

Would you put up CCC-SC-3, please. And go to I think I can start with Page 8, Line 9 through 11.

Dr. Denton, this is part of your summary section; is that correct?

WITNESS DENTON: Yes, it is.

MR. JACKSON: You indicate that the WaterFix project reduces inflows to and through the Delta. Would you describe how you come to that conclusion.

WITNESS DENTON: In terms of the inflows, I presented to you in my testimony that Freeport -- affected Freeport, the flows on the Sacramento River at Freeport are reduced as a result of the project in a large number of time -- a large percentage of time.

And then the flows through the Delta, we have reduced Delta outflows, but more importantly, we have reduced flows down below the North Delta intakes. And if you're thinking in terms of survival of fish migrating through the Delta and needing flow through there, then there's a reduction in flow there.

MR. JACKSON: You also indicate in this sentence that that worsens water quality for all uses. Is that simply municipal and industrial, or all the beneficial uses --

WITNESS DENTON: That's right. All the beneficial uses, including fish and wildlife.

MR. JACKSON: You also indicate in this sentence that the reduction of inflows to and through

the Delta allows for invasive species to thrive. What do you mean by that?

WITNESS DENTON: Just to get a build up of -- oh, this is more related to what happens in Suisun Bay with the clam and that you need -- when you have high flows, you can flush, sometimes knock back the population of clam. But when the flows decrease again, they'll come back. So if you have long periods of decreased outflow, then you'll have large populations of clam.

MR. JACKSON: And then you finish that sentence by indicating that the reduction of inflow to and through the Delta reduces the flushing of harmful contaminants out of the Delta. What kinds of contaminants are you talking about?

WITNESS DENTON: Just any particular contaminants that enter from ag or M and I sources that end up in the Delta waters, then, if you have high enough flows then, those will be moved through the system and out.

MR. JACKSON: And that would include things like selenium?

WITNESS DENTON: Yeah, selenium's a little tricky because that does build up in fish through their -- so the flushing of selenium is not necessarily

as effective.

MR. JACKSON: Methylmercury?

WITNESS DENTON: That one, I haven't really got any --

MR. JACKSON: All right. Calling your attention to Page 9, Line 9 to the end of 10. You're still talking about -- you indicate that the long-term average South of Delta deliveries for Boundary 2 would decrease by 32.8 percent relative to the No Action Alternative.

Why would that be true, sir?

WITNESS DENTON: Well, the Boundary 2 scenario is trying to mimic or at least best represent a higher outflow/higher inflow scenario consistent with the State Board's 2010 Delta flow reform. So if you need more outflow, then you're going to have less opportunity to export.

MR. JACKSON: So then it would be fair to say that the 32.8 percent relative to the No Action Alternative is what it would take according the 2010 testimony?

WITNESS DENTON: No, according to the Boundary 2 scenario. It wasn't -- it wasn't exactly meeting 75 percent of unimpaired flow, but it was the best effort that the State Board staff could come up

with to come up with a scenario that would be at least beholden to the ideals of the 2010 report.

MR. JACKSON: And the State Board's findings in that document, correct? They would require at least 32.8 percent?

WITNESS DENTON: Well, no, that would be a result. I mean, what the State Board was requiring was certain percentages of unimpaired flow.

MR. JACKSON: I think that's --

Page 12, Lines 3 to 7.

Would you indicate what you mean by this paragraph, in regard to the public interest?

WITNESS DENTON: I think that, because of the work that was done on the 2009 Delta Reform Act and the ideals of that was to say that, when we -- we need a solution to the Delta problems, and that solution to the Delta problems should have the ability to capture flows when it's available so that we can reduce exports during dry periods.

And so I'm just saying here that the project -- this particular version of the project, because it doesn't include anywhere to store water, additional storage south of the Delta, it ends up having to cut back on exports at the very time it should be using its maximum capacity.

So this particular version of the project, the way it's set up as a conveyance-only project with no additional storage, is not in the public interest.

MR. JACKSON: Thank you, sir. Calling your attention to Page 13, Lines 5 through 7.

You highlight that the WaterFix and Temperance Flat don't really work together. Is there anything presently proposed South of Delta that would work with the California WaterFix to provide a place to store it so that you could take a big gulp?

WITNESS DENTON: Yeah, the reason I mentioned Temperance Flat was that that was one of the storage projects that the Delta Stewardship Council was considering. And they were thinking, "Well, we could do something in the Delta, and we can combine it with storage." But I was using it as an example where they're so geographically distant that they really couldn't work together.

But they have -- there was a study recently by Aqua on the effects of increasing storage, and I think they did include something like 200,000 acre-foot of additional storage in San Luis Reservoir, which probably isn't enough to allow you to consistently take big gulps, but it would be a good start.

MR. JACKSON: Page 14, Lines 13 through 17.

Here, you indicate a change in DWR's water rights to incorporate the proposed WaterFix project will result in an increase in the quantity or amount of water the State Water Project is able to currently export South of Delta. What supports that particular conclusion?

WITNESS DENTON: This was just from reviewing the modeling studies of the modeling of the proposed project as it was at that time and identifying those -- those particular -- well, in terms of taking more when -- during dry periods from the Delta as well, I identify it as was the case in that Figure 7 that we've been looking at but also, just doing the mathematics, that you can say currently the State Water Project under normal or typical conditions is limited by the inflow to Clifton Court to 6680 cubic feet per second.

But you can get around that if you have a North Delta intake, and that would allow you then to get up to the full 10,300.

MR. JACKSON: And so on Page 15, Line 17, operating within the WaterFix parameters for State Water Project, with the new North Delta facility, is that how you got the figure of this could potentially represent a 54 percent increase in State Water Project exports from the Delta?

WITNESS DENTON: Yes, that's actually going from 6,680 to 10,300 is, -- if my math is correct, would be 54 percent.

MR. JACKSON: So while the average export might not be 54 percent, 54 percent would be what could happen in any given week or day or --

WITNESS DENTON: Right.

MR. JACKSON: -- some shorter time period?

WITNESS DENTON: They would get averaged out if you were just presenting the results of 82-year averages, but there are individual months when that could.

MR. JACKSON: On Page 16, Lines I guess 17 through 23, is Exhibit CCC-SC-17 your description of how that might work, the 54 percent number relative to existing conditions?

WITNESS DENTON: Sorry. Could you repeat the question? I was just. . .

MR. JACKSON: Yes. Is Line 17 to Line 23 simply a description of how operation within the -- what you call the PA, could get to that 54 percent number?

WITNESS DENTON: I take it you're referring to the Figure 4 of CCC-SC-17.

MR. JACKSON: Yes.

WITNESS DENTON: And that's just showing, yeah, there are multiple months when Delta outflow is low by 10,000 or 8,000 or less where the exports were actually increased as a result of the project.

MR. JACKSON: And at the end of -- on Page 17, Line 11 to 12, which is the first time your suggestion that you pick up later in your permit recommendations -- is that a reason to sort of cap that at 1.5 times Delta outflow?

WITNESS DENTON: Yeah. This is just a suggestion. And the number could change somewhat. But it is saying that, when your outflow is very, very low, you should only export a small amount, and then only when the exports are high enough can you take full advantage of the extra capacity of the WaterFix project.

MR. JACKSON: Now, in terms of inflow, which you mentioned earlier, on Page 18, Lines 8 through 12, you talk about inflows at Freeport, which is -- you point out is upstream of the proposed North Delta intakes, often decrease because of the proposed WaterFix project. And then some of the reductions are greater than 30 percent. Do you know why that happens?

WITNESS DENTON: I've tried to sort of get into it, but I haven't really, you know, worked out

exactly why that happens.

MR. JACKSON: But it does happen --

WITNESS DENTON: I was surprised it did happen because I hadn't expected it. And when I saw it like that, I thought it was something that needed to be pointed out.

MR. JACKSON: Yeah. And would it be especially in July, August, and September as you indicate on Line 17 of Page 18?

WITNESS DENTON: Yeah, I think that was -- by looking through the data, it did seem that those are the months when this mainly occurred.

MR. JACKSON: From your experience working on the Delta, are those critical time for temperature, flow, and recreation?

WITNESS DENTON: I really haven't got that kind of experience to answer that directly.

MR. JACKSON: You make a point on Page 19 at Lines 14 through 17 that there's something about using long-term averages that make that testimony unsuitable for use by decision makers, resource managers, Bay Delta stakeholders, and the general public.

What is your reason for coming to that conclusion?

WITNESS DENTON: I think it's just from

general experience that, when you do average salinities over a period of time, you lose all the peaks, which could have a problem.

And then the classic example is that, if you have a river and you just present the annual temperatures, it hides the fact that there may be a period in the summer where the temperature is above lethal temperature for a couple of weeks, and that's going to kill your fish. So averages don't really count in that particular instance.

MR. JACKSON: To your knowledge, was that one of the problems at Shasta Reservoir in the years 2014-2015?

WITNESS DENTON: I really didn't follow that event in enough detail to testify about it.

MR. JACKSON. On Page 22, Lines 7 through 10, you point out that the WaterFix Final EIR/EIS acknowledges that there will be months of substantial degradation at Emmaton, again, July through September and April in this case. Why does that happen, sir?

WITNESS DENTON: Again, I'm not exactly sure why that happens enough to speak authoritatively about it. I was just concerned that -- because of what was happening in October was masking some of the water quality impacts. And I didn't want to leave the

impression that they weren't -- even without that consideration, I wanted to make out -- point out that there were significant degradation at other locations at other times. So that's why I was quoting from the WaterFix EIR/EIS.

MR. JACKSON: On Page 24, Lines 6 to 7, you indicate that water quality -- WaterFix water quality monitoring shows frequent exceedances of State Water Resources Control Board D1641, even in the No Action Alternative.

And then you come to the conclusion that these exceedances render the water quality analysis useless for determining significant adverse effects for the WaterFix on Delta water quality.

What do you mean by "render it useless"?

WITNESS DENTON: Actually, sir, which line is that? Oh, okay.

Yes, well, it's very hard for the Board to make a decision on how a project is going to operate if it's not meeting certain standards and then to correct for the fact that it's not meeting certain standards, they'd have to adjust the operations, release more water from Folsom, as we were testifying about before, discussing before.

So in a particular period of time, if the

standard is not being met, then something has to change. And then that has a chain reaction effect because then the next month something else has to change to compensate. So we're not really getting a true picture of how this project will operate because even the petitioner is saying "don't worry" essentially, "In real operations, those standards will be met," but how will they be met by adjusting operations?

MR. JACKSON: Do you know whether or not -- in the past they haven't been met. Do you know whether that's because the project is incapable of meeting them?

WITNESS DENTON: You're talking about historically?

MR. JACKSON: Yes.

WITNESS DENTON: Well, the operators do their best to meet standards, but sometimes they get called out that they don't release enough water early enough to meet standards, something like that.

MR. JACKSON: On Page 27, you have a discussion about the difference between the 16-year water quality period that's used for the WaterFix and the 82-year simulation period and, of course, again, the average monthly results problem.

Which of these do you think would most accurately reflect the Cal WaterFix program, the 16-year period or the 82-year period?

WITNESS DENTON: I think the 82-year period would be much better than the 16-year period.

MR. JACKSON: And, again, why is that?

WITNESS DENTON: Actually, the main reason -- I think I had it in my written testimony, and I think DWR in some of their discussions about the 16 versus 82 even acknowledge that, if you have a change, for instance, from a critical year to a wet year, maybe it doesn't really matter because all the wet year will freshen up the Delta, et cetera, et cetera. But you have a change from a critical year to a below normal year, you know, you might think things are better, but there's not enough flow necessarily to compensate and improve situations in the Delta.

So you need to look at all those transitions, transition from the one normal year to a critical year, et cetera, et cetera. And within 16 years, you don't have enough combinations. And I think I use in my testimony that the change from a critical to a below normal might be one that you'd be really interested in. I don't think there were any in that particular 16-year period.

MR. JACKSON: Thank you, sir. I'm going to skip a number of questions and move to Page 34, Line 10 to 12, which is your heading of this section.

You make the point that -- somewhere in here, that about half -- I guess it's on Line 23. Approximately half of the total WaterFix South of Delta exports will be -- will still rely on diversions from the South Delta into Clifton Court.

WITNESS DENTON: Yes.

MR. JACKSON: Is that correct?

WITNESS DENTON: Yeah, if you look at the modeling -- it's changed a little bit with each alternative, but it's around about 50 percent.

MR. JACKSON: You point out that half of the water does not have state-of-the-art fish screens and that has fishery effects. That is part of the heading to this section.

WITNESS DENTON: Yes, because Clifton Court Forebay is unscreened and the Jones Pumping Plant is poorly screened.

MR. JACKSON: You point out that DWR has done some proposed design at Line 16 through 18 -- and then I think you have an exhibit, CCC-SC-31, Figure 7-5 and 20-1. And I'm not going to put those up because I'm trying to move as fast as I can -- and come to the

conclusion that a proposed Delta project that fails to screen the largest diversion point in the Delta is not in the public interest.

Why -- do you have any idea why they don't screen the South Delta diversion when they're touting the screens on the Sacramento River?

WITNESS DENTON: I think part of the problem is always that, if you draw the fish down into the South Delta and you block them with a screen, then they've got nowhere to go. So that would be a problem if you put the screen directly on the Clifton Court gates.

But if you do this particular design, where you've got fish screens taking water off Victoria Canal, then that's an opportunity for the fish to move past without getting sucked into that particular diversion. And there's enough flushing flow with the tides going back and forth along Victoria Island that it would be suitable way of doing it. The fish would be able to move away from the intake without getting sucked up against the intake.

MR. JACKSON: And my last line of questioning is these principles for developing water right permit terms. We've talked a little about -- on Page 38, 5.1.

Your recommendation is to set specific limits

on the operation of the proposed WaterFix project. And you think those should be in the permits?

WITNESS DENTON: Yes, there's a -- it's difficult when you're writing testimony like this because you don't want to say -- put a particular number on -- put a particular cap on something because then you -- kind of sounds like you're okay with the project because you're saying go ahead.

But if people are going -- the Board is going to go ahead with the project, then we need to constrain the project to what is being modeled and what is being analyzed. And we don't want a situation later where there is no South of the Delta storage built and so that the project then operates completely differently than what we've had presented to us.

MR. JACKSON: So to move right along, each of these headings, 5.1, 5.2, 5.3 on Page 38, 5.4, 5.5 on Page 39 would be Contra Costa and Solano County's second choice, correct?

WITNESS DENTON: Yes. And again, they are suggestions for the Board to consider. We're not demanding them at this stage. We need to think some of them through and maybe make some additional recommendations in rebuttal -- in later rebuttal and closing.

MR. JACKSON: But for all of your reasons in your testimony, the position of Contra Costa and Solano is that they shouldn't build the project as configured today?

WITNESS DENTON: That's our first.

MR. JACKSON: Thank you.

WITNESS DENTON: As configured today.

CO-HEARING OFFICER DODUC: Thank you, Mr. Jackson. Since we have another half an hour before our drop dead -- well, not drop dead but hard stop, I'm going to ask, Ms. Des Jardins, that you go ahead and begin your cross-examination, keeping in mind that we will need to stop at 6:00 o'clock or earlier.

Mr. Mizell.

MR. MIZELL: Thank you. Tripp Mizell, DWR.

Before Mr. Jackson leaves, I was hoping to bring this up. We're looking at a housekeeping issue here. The CSPA-221 on the website is inaccessible. It's the statement of qualifications for Tom Stokely I was wondering if someone might be able to tell us if the file is corrupted on your end as well. And if so, maybe Mr. Jackson could send it out to the hearing list.

CO-HEARING OFFICER DODUC: All right.

MR. JACKSON: Mr. Mizell did bring it up to

me. I don't know whether the file is corrupted.

Mr. Stokely is also testifying for PCFFA, and his CV would be the same in both cases.

CO-HEARING OFFICER DODUC: We will check.

MR. JACKSON: Thank you.

CO-HEARING OFFICER DODUC: Are you able, Ms. Des Jardins, to give us an outline of what you will be exploring that is so different than all the other cross-examiners?

MS. DES JARDINS: Well, let's see. I would like to ask him about aqueduct and canal capacity, modeling, change in water rights, the -- I'd like to ask him some about the export limits. And since Dr. Denton was participant when the export limits were set, I'd like to ask him a little bit about the initial proposal, the reasons for it. And I'd also like to ask him about the current Water Quality Control Plan outflow and some questions about when those were set. And -- and there's a little bit about the DSM-2 modeling supposed to be calibrated and verified, so I'm probably going to get through all of these.

CO-HEARING OFFICER DODUC: All right. Why don't you go ahead and get started.

CROSS-EXAMINATION BY MS. DES JARDINS

MS. DES JARDINS: Can we please bring up

Dr. Denton's testimony, CCC-SC-39, at Line 21.

And Dr. Denton, you discuss how -- the aqueduct and canal capacity South of the Delta here?

WITNESS DENTON: Yes.

MS. DES JARDINS: And your opinion is that limits how much water can be exported during wet periods.

WITNESS DENTON: Yes. If you're trying to take a big, big gulp of more than 14,900 cubic feet per second it's not possible unless you have a place to park that water upstream of the two aqueducts because you can't move any more than that all south.

MS. DES JARDINS: Is there anything in the CVP or SWP permits that would prevent the projects from increasing the aqueduct capacity South of the Delta once the WaterFix project is built?

WITNESS DENTON: They would have to go to the State Board to get that change, though, because a number of those permits are -- those quantities are in their water rights.

MS. DES JARDINS: Okay. Are you aware of Reclamation's proposal to increase the capacity of San Luis Dam?

WITNESS DENTON: San Luis Reservoir?

MS. DES JARDINS: Yes.

WITNESS DENTON: Yes, I'm aware of that. It's being studied and some analysis is being done on it.

MS. DES JARDINS: Okay. I'd like to go to Page 25 at 12. And here you discuss that the water quality standards must be met in the modeling. And you discuss accuracy of the models.

Why -- why do you believe it's not sufficient, as you state here, to simply state that the models do not reflect the ability of SWP/CVP operators to meet those water quality objectives?

WITNESS DENTON: Well, I acknowledge that modeling is hard, and it's hard if you're using a monthly model to model what's going on in the Delta when there are daily standards out there.

But I think from the examples I gave you that they're missing the mark a lot. So we really need to have much better modeling runs that eliminate as many of those flaws as possible.

MS. DES JARDINS: Okay. And your opinion that the exceedances are due to insufficient water being left in the Delta as Delta outflow?

WITNESS DENTON: Yes, this is in part based on some of the earlier modeling before we started having issues with mismatches between monthly and daily flows and things like that when we hit those spikes.

But I think a lot of the modeling for a lot of the projects in the past have exceeded the standards, and there's always been a line saying, "Don't worry. That won't happen in real life or in real operations."

So if your model is showing that the -- the chlor- -- the water quality, the salinity is too high, then the solution to that is that the model should have released more water or have more water as Delta outflow to reduce the sea water intrusion and therefore meet the standard.

So what does that mean? If you have a higher outflow, it means you can't export as much, or you release more water from Folsom or another upstream reservoir. And then that impacts what happens to subsequent flow. And we need to know all about that, what really will happen rather than what they're modeling.

MS. DES JARDINS: So your opinion is, without these corrections, there's not enough accurate information to assess impacts for this hearing?

WITNESS DENTON: Yes.

MS. DES JARDINS: All right. And I'd like to go to Page 15, Line 18.

And here, you say that it could increase SWP exports South of the Delta to 10,300 cfs when Delta

outflows are as low as 4,000 cfs?

WITNESS DENTON: Yeah, that's just reporting what I found and I showed in the examples of in my testimony.

MS. DES JARDINS: So in that case, the SWP exports could be -- like, that's like two and a half times Delta outflow?

WITNESS DENTON: Yeah, if you look at it that way.

We've had that sort of thing going on in the past, but we've been limited to the existing amount that we can export. But now we're asking to increase that by, in the case of the State Water Project, by another 54 percent at a time when the policy of the State is -- or at least not the policy of the State, but the concept is to reduce exports as much as possible in dry periods to help improve the Delta ecosystem.

MS. DES JARDINS: Is this in part because of the exemption of the North Delta diversions from the export limit calculation in Decision 1641?

WITNESS DENTON: It could be that that is -- if they had used the export-inflow ratio that people understood initially and that is in D1641, then it may have controlled or may have reduced their exports. But

I didn't look into that particular thing. I don't think it was necessarily controlling at that time.

MS. DES JARDINS: That would take more modeling.

So could we go to Exhibit SWRCB-27. It's Document Page 15, PDF Page 26. And this is the -- I just wanted to bring up the export limits.

Okay. How about PDF Page -- oh, it's 26. There we go. So let's scroll down to export limits.

So, Dr. Denton, is this your understanding of the -- this is Table 3 in the 2006 Bay-Delta Water Quality Plan.

And we're apparently sending the document for signature now.

So is this your understanding, it's 35 percent of Delta out- -- inflow?

WITNESS DENTON: Yeah, the E/I ratio is at times 35 percent of the limit or 65 percent, and sometimes it's 45 percent.

MS. DES JARDINS: And you were a participant in the 1995 Bay Delta Water Quality Control Plan hearing when these export levels were set?

WITNESS DENTON: Yes, I was.

MS. DES JARDINS: I'd like to go to Exhibit DDJ-245, please.

This is a copy of the Biological Explanation of the Joint Water Users Proposed Bay Delta Standards. Are you familiar with this document?

WITNESS DENTON: Yes, I am.

MS. DES JARDINS: I'd like to go to PDF Page 43 of this document. And if you could read the section that's highlighted in yellow. First, let's -- let's look at a table. Can we -- if we can go up.

So this is a table of the percent of inflow diverted. And prior to, it shows that prior to the Decision 1995 inflows -- could divert at fairly high percentage of inflow in dry and critically dry years?

WITNESS DENTON: That's what it looks like.

MS. DES JARDINS: Up to like 44 percent on average?

So let's scroll down to the yellow highlighted section. And the first part mentions the increase in inflow exported during spring. What's the conclusion there? On the first yellow highlighted section, can you read it? Just read the yellow highlighted, the first yellow highlighted section.

MR. KELLER: Objection. I'm failing to see what the question -- what we're going toward. Are you just asking Dr. Denton to --

MS. DES JARDINS: Yeah, I'm just asking now about if he's familiar with the first yellow highlighted section and the reasoning.

CO-HEARING OFFICER DODUC: While he's reading that, Ms. Ansley.

MS. ANSLEY: I'm going to object that it lacks foundation. I'm struggling because we're so close in that I didn't see the title to the table, and I don't know what this section is. And I'm not sure that the witness -- although I know he's struggling to answer the questions asked him, I'm not sure that any of us know what analysis we're looking at here. He may know, but I don't know.

MS. DES JARDINS: I'm sorry. Let's go back to the previous page where -- and the previous -- and a little bit before. And this is Section 2214 export-to-inflow ratio limits, discusses the proposal to set them.

And does it --

WITNESS DENTON: If you want me to render opinion on it, it seems to me that the piece that we should be reading is the Biological Objective there that says, "To reduce fish eggs and larvae entrainment and mortality at the pumps through export restrictions." And that's why I have a concern anyway

about the way the E/I ratio is defined by the Waterfix people as that they're saying that we don't need to include the North Delta intakes. And yet we heard from some of the fish experts for the petitioner saying that there are going to be -- there is going to be spawning upstream of the North Delta diversion, and so there's likely to be fish and eggs and larvae -- well, there's definitely fish, but eggs and larvae can also be imprisoned in the North Delta and therefore entrained into the North Delta pumps. So that would be a good argument for saying the export-inflow ratio should include the South Delta pumps and the North Delta pumps.

MS. DES JARDINS: Okay. Thank you.

Can we also go down to the yellow section as well. Oh, here it says --

CO-HEARING OFFICER DODUC: Don't read it, please.

MS. DES JARDINS: Yeah. Just look at it for a minute.

WITNESS DENTON: Which one am I -- the yellow?

MS. DES JARDINS: Yes.

So that -- when does that propose increasing exports?

WITNESS DENTON: I'm sorry?

MS. DES JARDINS: When does that propose increasing exports?

MR. KELLER: Objection, I'm -- that's a vague question. I'm not quite sure what you're referring to or --

MS. DES JARDINS: Yeah, well -- is this kind of like the "big gulp, little sip" concept?

MS. ANSLEY: I'm going to also say vague and ambiguous. Is this -- is what -- perhaps she can --

MS. DES JARDINS: Are the intended benefits -- well, first, under -- what's the proposal for allowing exports to increase or the general --

CO-HEARING OFFICER DODUC: Mr. Keller.

MR. KELLER: Vague and ambiguous. I struggle to see how Mr. -- Dr. Denton is going to answer the question and relate it to his testimony today.

CO-HEARING OFFICER DODUC: Sustained.

MS. DES JARDINS: Okay. Well, I just wanted to ask you about the basis of the -- does this not say that exports should decrease during years when freshwater inflow to the data is decreased?

WITNESS DENTON: I thought that was the idea of the export-inflow ratio. When imports are low, then export should be low.

MS. DES JARDINS: And isn't the WaterFix now

increasing exports when inflows are low; isn't that your testimony?

WITNESS DENTON: Well, my testimony is when outflows are low, but it can end up being equivalent that if outflows are low and exports are high, then maybe inflows are low as well.

MS. DES JARDINS: Okay. Thank you.

WITNESS DENTON: My testimony was focused on the relationship between exports and outflow.

MS. DES JARDINS: Yes. So I'd also like to ask you about -- there are increased outflow requirements in the 2006 Water Quality Control Plan correct?

I'd like to pull up Page 21 of Exhibit SWRCB-27 -- 32.

MR. KELLER: Objection. I don't think that Dr. Denton has, in his direct testimony, related or discussed increased export or increased requirements that the cross-examiner is referencing.

MS. DES JARDINS: He's discussed Boundary 2 and increased outflow requirements in Boundary 2, and I wanted to ask him about the existing outflow requirements.

WITNESS DENTON: This is D1641.

MS. DES JARDINS: Yes, and are you familiar

with this table, Dr. Denton?

Let's scroll down so we can see the whole table and scroll out a little bit.

WITNESS DENTON: What you're showing us is the Chipps Island and Port Chicago X2 standard in the spring, is basically what that is.

MS. DES JARDINS: Yes.

WITNESS DENTON: And that was something that was developed through the Bay-Delta Accord in 1994 and adopted by the State Board as '95 Water Quality Control Plan and then into the Decision 1641.

MS. DES JARDINS: Let's scroll down to the Footnote (d) there. And are you familiar with the condition in Footnote (d)?

WITNESS DENTON: Yes.

MS. DES JARDINS: And what's this called?

WITNESS DENTON: Well, at the time, it was called the Roe Island trigger. And all it was saying -- or what it was trying to do is say, if there was a period of very high flows that caused the salinity at Port Chicago, which is next to Roe Island to be very fresh or fresh enough, then that should be maintained for a little bit longer to allow some flushing and ideal conditions for the fish. But it was something that really didn't trigger that often. In

fact, the project operators could operate in such a way that, you know, they could avoid triggering that. So it really hasn't triggered that often. And when it does trigger, it kind of causes problems because suddenly you have to find a whole lot of extra water to meet it.

MS. DES JARDINS: I would like to ask you a little bit about your testimony relating to this trigger. Can we put up DDJ-280 that I just gave you.

CO-HEARING OFFICER DODUC: Would you remind me Dr. Denton what was your testimony relating to this trigger?

WITNESS DENTON: Yes, I was wondering myself, actually.

MS. DES JARDINS: Okay. You didn't -- he didn't testify specifically on the trigger. I did want to ask him about the trigger.

WITNESS DENTON: This is really more focusing on what we have as existing under D1641.

MR. KELLER: So I'll renew my objection that it doesn't relate to Dr. Denton's direct testimony. So if --

CO-HEARING OFFICER DODUC: Sustained.

MR. KELLER: -- she'd like to explore it.

MS. DES JARDINS: All right. So then I'd like

to go to your testimony on Page 18 at Line 6. And you mention that inflows at Freeport often decrease.

WITNESS DENTON: Yes, that's what the modeling shows.

MS. DES JARDINS: Do you have any idea why?

WITNESS DENTON: Yeah, Mr. Jackson asked me that at one point, and I really wouldn't want to venture a reason for it. I will look into it a little bit before rebuttal, but I haven't really got into that sort of detail yet.

MS. DES JARDINS: All right. And I'd like to go to Page 24 at 18.

And you mention that -- you mention that exceedances, meaning that too much water was exported, your interpretation is that the exceedances in the modeling are because too much water was exported in a month when the exceedance occurred?

WITNESS DENTON: Yeah. The main reason is that, if you have Rock Slough standard or Contra Costa Canal standard is exceeded, then it means there wasn't enough flow, if it was something caused by sea water intrusion, and therefore -- enough outflow. And therefore, they would have had to -- or if they did the -- redid modeling or in real life, then they would create a situation where there was more Delta outflow,

and that will be through additional releases from upstream or reducing exports.

MS. DES JARDINS: Thank you. And you state that -- let's go down to Page 25 at 4. And you discuss calibration and validation against -- well, you call it verification against historical data for the DSM-2 water quality model.

And you state that -- you believe that the exceedances indicate the salinity outflow computation isn't accurate enough. It -- do you think that's related to a calibration issue? I mean, this is what this implies.

WITNESS DENTON: I think the main reason is within CalSim there's an algorithm that tells them how much outflow they should have to meet a Delta standard. They're not running DSM-2; they're just doing a calculation within the CalSim model.

So calibrate that algorithm against DSM-2 modeling output, and then later on they run DSM-2 to make sure that they've done everything correctly, and they get a mismatch, so -- or they find that, in trying to meet 250 standard at Rock Slough, when they run it through the DSM-2 model, they get 300 chloride or something like that. So then there's a mismatch.

And it indicates to me at least that the

salinity outflow algorithm that they have in CalSim is not accurate enough.

MS. DES JARDINS: Do you know if the salinity outflow is done with an artificial neural network?

WITNESS DENTON: That's what they're using, yes.

MS. DES JARDINS: And have they provided the artificial neural network calibration information anywhere that you're aware of?

WITNESS DENTON: Well, through -- there's various users groups in the past have talked about it and presented results. But I haven't seen anything recently.

MS. DES JARDINS: So you aren't really able to examine the actual calibration of the artificial neural network and know why --

WITNESS DENTON: No.

MS. DES JARDINS: -- why it wasn't releasing water?

CO-HEARING OFFICER DODUC: Ms. Ansley.

MS. ANSLEY: Objection, that misstates what he just said he just said that in the past the user groups have maybe presented it. And she just changed that to "so he can't look at it now." And that's not what he answered, and that's not the question she asked.

MS. DES JARDINS: He said it was a while ago, and I was talking good current modeling.

CO-HEARING OFFICER DODUC: Just move on.

MS. DES JARDINS: All right. And finally, you were asked a question about whether the -- you said the criteria were programmatic for -- the operational criteria with the WaterFix were programmatic?

WITNESS DENTON: Are you talking about the Biological Opinions?

MS. DES JARDINS: Yeah, some of the Biological Opinions were programmatic, and some of the criteria weren't finally defined. I had a question about that.

WITNESS DENTON: Can you point to a certain place in the testimony, because I think Mr. Jackson took us there at one point.

MS. DES JARDINS: Okay. I apologize. I just -- I wanted to ask a question about the NMFS BiOps, but I didn't record the exact place in your testimony. Unless --

CO-HEARING OFFICER DODUC: Why don't you just ask the question.

MS. DES JARDINS: Well, are you aware that the NMFS BiOps say that the operational criteria are likely to change?

WITNESS DENTON: I am really not up to speed

enough. I read through there. I was concerned about some of the things I saw, but I'm not prepared to testify, you know, about what changes will be made.

MS. DES JARDINS: Okay. That concludes my cross-examination.

CO-HEARING OFFICER DODUC: Is there any redirect, Mr. Keller?

MR. KELLER: I have no redirect.

CO-HEARING OFFICER DODUC: Dr. Denton just thanks you in his mind for that.

At this point, does this conclude your case in chief? And if so, would you like to move your exhibits into the record?

MR. KELLER: It does, and I'll request to move into the record -- no.

I will move to the record CCC-SC-1 through and including 37, excepting only CCC-SC-29 and including 6-Errata.

CO-HEARING OFFICER DODUC: But not 6.

MR. KELLER: But not 6; 6-Errata, that's correct.

CO-HEARING OFFICER DODUC: Thank you.

Any objections?

(No response)

CO-HEARING OFFICER DODUC: So moved.

(Contra Costa County, Contra Costa Water Agency, and County of Solano Exhibits CCC-SC-1 through CCC-SC-5, CCC-SC-6 Errata, CCC-SC-7 through CCC-SC-28, and CC-SC-30 through CCC-SC-37 admitted into evidence)

CO-HEARING OFFICER DODUC: Thank you, Mr. Keller. Thank you, Dr. Denton.

Thank you, Ms. Des Jardins.

And with that, we are adjourned until tomorrow at 9:30, and we will begin with CSPA Panel No. 1.

(Whereupon, the proceedings recessed at 5:57 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 which typewriting 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 26th day of April, 2018.

DEBORAH FUQUA

CSR NO. 12948