BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

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

JOE SERNA, JR. BUILDING

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

BYRON SHER AUDITORIUM

1001 I STREET

SECOND FLOOR

SACRAMENTO CALIFORNIA

PART 1B

Thursday, December 1, 2016

9:00 A.M.

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Pages 1 - 211

Reported By: Deborah Fuqua, CSR No. 1248

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APPEARANCES:

CALIFORNIA WATER RESOURCES BOARD

Division of Water Rights

Board Members Present

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

Staff Present

Diane Riddle, Environmental Program Manager
Dana Heinrich, Senior Staff Attorney
Kyle Ochenduszko, Senior Water Resources Control Engr.

Jason Baker
Kevin Long
Thaddeus Hunt

For California Department of Water Resources

James (Tripp) Mizell, Senior Attorney

Duane Morris, LLP
By: Thomas Martin Berliner, Attorney at Law
Jolie-Anne Ansley, Attorney at Law

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

State Water Contractors

Stefanie Morris
Adam Kear
Becky Sheehan

(Continued)

APPEARANCES (continued)

Central Delta Water Agency, South Delta Water Agency, Lafayette Ranch, Heritage Lands Inc., Mark Bachetti Farms and Rudy Mussi Investments L.P.
John Herrick

San Luis and Delta-Mendota Water Agency
Hanspeter Walter

California Sportfishing Protection Alliance
Michael Jackson

County of San Joaquin
Thomas Keeling

I N D E X



(All exhibits to be ruled upon for admission at the end of Group 31 case in chief)

Thursday, December 1, 2016 9:01 a.m.

PROCEEDINGS

MR. JACKSON: Madam Hearing Officer, I got a phone call from two of my witnesses who are coming from Chico. They were at Riego Road 30 minutes ago. There evidently is quite a traffic --

CO-HEARING OFFICER DODUC: I presume.

MR. JACKSON: I would expect them within the next five minutes or so. And they are not witnesses who will be testifying immediately.

CO-HEARING OFFICER DODUC: Great, thank you. Let me get back to my spiel.

Good morning. Welcome back to this water rights hearing on the California WaterFix Change Petition. I am tam Doduc. With me to my right are Board Chair Felicia Marcus -- or is Board Chair Felicia Marcus. And I expect to be joining us shortly will be Board Member DeeDee D'Amado. To my left are Dana Heinrich and Kyle Ochenduszko.

Are we expecting Ms. Riddle today?

MR. OCHENDUSZKO: Not sure.

CO-HEARING OFFICER DODUC: Okay. Well, if she comes, she comes.

We are also being assisted today by Mr. Baker and Mr. Long.

Our usual announcements -- please take a minute right now and identify the exits closest to you. In the event of an emergency, an alarm will sound, and we will evacuate using the stairs, not the elevator, down to the first floor and meet up in the park across the street. If you're not able to use the stairs, please flag one of us or people wearing orange fluorescent clothing and caps, and you'll be directed to a protected area.

Second announcement is, as always, this hearing is being recorded and Webcasted. So please provide your comments while speaking into the microphone and identify yourself and your affiliation before doing so.

Third, and as always most importantly, please take a moment and put all noise-making devices on silent, vibrate, do not disturb or, as the Chair likes to call it, stun.

With that, we going to have one housekeeping item from Mr. Jackson. Thank you for that update on your witness. The other thing I wanted to alert people to is, after spending some time looking through the schedule for the next few weeks, we received an e-mail from Restore the Delta that they have greatly reduced their requested time for direct and opening, which is

very commendable. But what that means though is that frees up a lot of time on Friday December 9th that I want to use up.

So Mr. Volker and PCFFA, and Ms. Des Jardins -- so that's Groups 38 and 37 -- are on notice that they need to find someone to cover for them on December 9th if you're not able to make it.

My suggestions are perhaps No. Group 39 and 41, North Delta CARES and Snug Harbor, perhaps they may be able to move up. But in any case, I will let everyone work that out. But it looks like Restore the Delta will be needing less time than we expect and should be able to be wrapped up on December 8th or early December 9th, very early December 9th. So that's a heads up for parties that are coming up to do their case in chief.

With that, if there's no other housekeeping issues, I will now turn the floor over to Mr. Jackson to introduce his witnesses, present his opening statement and conduct his case in chief.

MR. JACKSON: Thank you, Madam Chairman.

Would you all stand up.

And you want them sworn in, right?

CO-HEARING OFFICER DODUC: We'll go ahead and administer the oath now, then.

(Witness Panel sworn)
BILL JENNINGS, CHRIS SHUTES,
BARBARA VLAMIS, TOM CANNON,
DR. FRED LEE, DR. KIT CUSTIS,
DR. ED WHITELAW, ARVE SJVOLD,
and JIM BROBECK,
called as witnesses by protestant Group 31, having been first duly sworn, were examined and testified as hereinafter set forth:

CO-HEARING OFFICER DODUC: Thank you.

MR. JACKSON: Thank you for the opportunity to do an opening statement. While there are three groups that are present in front of you, the California Sports Fishing Protection Alliance, the California Water Impact Network, and AquAlliance, they have one story to tell, and they depend on each other to tell the story because the story from our -- from our testimony will be much like the structural story told by the projects, which is that, in the same way that the projects are an integrated program that runs from Trinity Lake to -- and from the Westside tributaries -- or the Eastside tributaries of the San Joaquin into the Delta, they affect millions of people all the way through the watershed.

And in the same way that the Bureau and DWR use the storage facilities scattered throughout the drainage to operate for the benefits of their project, the benefits of their project affect all of the people who live within the areas of those projects.

So it's a watershed story. The watershed story begins essentially in the north and affects people who live both above and below the rim dams that are -- that have been established by the projects. Those rim dams control the flow; they control the timing of everyone's life in terms of water down below them.

So we're going to try to sketch that story for you and our relationship to the existing projects in order to show you that we believe that the change in point of diversion and the gigantic infrastructure attached to that change are a unique situation for your consideration.

In a typical change in point of diversion, you take an old point of diversion and you move it somewhere else. And you -- in terms of a farmer or, in the old days, a gold miner, that was a period of miles. And there may only have been a few people affected in between it.

This -- we are dealing only with legal injury

to legitimate water users at this point. And so we're going to describe in this testimony who we think those are, and then we're going to compare it to what we heard from the project -- what we know from the project's -- from the petitioner's filings and from what we've heard from their testimony to show that we don't have any idea who's hurt by this change in point of diversion.

We don't have any idea what the injuries are going to be, and we won't know that under the proposal of the projects until the projects -- the billions and billions of dollars that are invested in the projects are finished because we don't have a place in nature where we can test this project. We're not going to know who's hurt until -- until it's built, if you authorize the point of diversion.

So the testimony will move down the watershed. The AquAlliance testimony will be -- will exhibit that, for instance, Mr. Brobeck will testify that people who have individual wells in the Sacramento Valley are dependant upon their legal use of water from below their land. And yet there's been no examination of what it's going to do to the groundwater in the Sacramento Valley. There's been no evidence presented on whether or not the projects even know how it will

affect the land even in the face of the fact that the purpose of the change in point of diversion as explained in the petition is to collect water from below the rim dams in order to do their big gulp.

At the same time, they're holding water exactly as they did before, according to their testimony, in their rim dams. So what we have is a new water source, to a great extent, and the design of the project is to enable that water source to expand the period of time that it can collect water into very significant areas for recharge of the groundwater that is presently keeping the Sacramento Valley stable in terms of water supply for approximately a million-some-odd people. They're not all odd, but in any event, they -- they don't know from reading the petition how they're going to be affected.

As we move down the watershed, we're going to try to connect up the surface water and the groundwater. And that will be mostly through the testimony of Kit Custis. Mr. Custis's testimony is supported by his many, many years of working on groundwater issues in the Sacramento Valley and in the Delta.

There are -- he will describe that, over time, streams that were gaining streams for surface flow from

the groundwater in the Sacramento Valley have become losing streams. He will describe that, in the Delta, groundwater used to run toward the Delta. And now it runs away from the Delta. And that -- and that there is no indication in the -- in the proposal that any of that has been considered and what the impact will be of expanding the amount of water that can be captured from below the rim dams, where all of these people live, and what will happen in terms of injury to groundwater users who are legally allowed to use the water under their land.

And everything from Article 10, Section 2 to an extensive amount of case law indicates that that's a superior right to an appropriative right which is held by the projects for their existing operation which will continue in some effect from the South Delta, using the existing facilities, and from the three huge new diversions on the Sacramento River.

But that has -- that has effects on people and water users within the Delta. We're going to try to describe what you would need to do to determine what some of those effects are and why the testimony so far that supports the petition has failed to do so.

The -- that testimony will be given in terms of foundation and factual information by the first

eight witnesses. The ninth witness, Dr. Ed Whitelaw, Professor Emeritus of Economics at the University of Oregon and an individual who's been working in terms of defining injury, both environmental and economic, in some of the largest cases in the United States for the last 40 years, was tasked to determine whether or not he could determine from the basis of the evidence given by the petitioners whether or not people would be injured. And you will hear his testimony. And that will be at the end of our presentation.

The -- we're going to begin with testimony from Chris Shutes that basically calls into question whether or not this is actually a change petition. We know that the Bureau never had a point of diversion on the Sacramento River. And so for the Bureau -- and we do understand from the testimony that the Bureau is one of the petitioners but is not going to -- or we don't know yet whether the Bureau will own the project with DWR or what they will do with DWR. But we've -- they've petitioned to move water rights from somewhere. And yet the time for the build-out on the -- on the Bureau's project expired in 1990.

So the Bureau never had anticipated project at these locations. The -- if their water rights were going to be perfected, 1990 was the last date.

DWR's situation is slightly different. They originally had a point of diversion in the North Delta. It is not the three points of diversion that they're talking about today. And their time to finish their original project ended in 2009. And Mr. Shutes is going to testify about CSPA's protest of that extension of time and what happened. We haven't had -- we filed the protest; we haven't had the hearing. And yet we're talking about moving expired water rights to new locations as if it was simply a change and not a new water right request.

Mr. Cannon is going to testify as to his long experience working for lots of different government agencies on lots of different sides in the Delta and his familiarity with all of the facilities. The facilities control the flow. The facilities control the storage. The facilities of these two petitioners are not going to change under this petition. They're only going to divert extra water from below them, as I understand the petition.

So his testimony will indicate why he believes that won't work and why he believes that will increase the harm to all legal users of water in California because it will change the amount of -- it could change the amount of water in storage throughout the system

temporally, over time, that using the big-gulp/little-sip and the new facilities, the goal is to get more water and that leaves less water in carryover storage, logically.

We don't have an operational plan. We don't have any idea about the purpose of the use of this water. We don't have any idea about where the water will go if -- if they take extra water. There is no real place or purpose of use described in this petition. So determining who's injured is impossible on the basis of this evidence.

There is a -- what looks to be a kind of recognition that the people testifying will probably come back to again and again. And that is the tool used to prove -- to carry the burden of proof of no injury, the tool used is CalSim.

CalSim was not developed to predict injury. Everything that we heard is that it's not -- it can't be, it shouldn't be used in a predictive mode. And yet it is the only evidence. And yet it's only an artifact of what CalSim was designed to do.

The compliance with D1641 -- I know we're not supposed to bring up fish, but D1641 was designed for fish. It was designed for flow. There was never a consideration of people. There was never a

consideration of what it would do to water supplies in other places. There was no evidence put on that indicates that they even recognize what all the uses are. There is no list of those uses. There was no examination of those uses.

We've been told a number of number of times not to duplicate evidence that others have put on and that we can rely on that evidence. And so I think the simplest way to understand it is, when I open my refrigerator, I often see Bogle wine because it fits my budget and it's good wine. And it's below the new takeout. And it was described to you by Land and Others. And it's just one example.

Now, it's an example that D1641 has a causal relationship with because D1641 is about salinity, to an extent, and salinity in wine is a killer. And if salinity changes for people like Bogle and for thousands of others who grow other kinds of crops, if the salt level goes up and wine tastes like salt, they're going to lose this customer as I move to something else in that price range that tastes good because it's not salty.

Now, can I prove that it will be salty? No. Is it our burden of proof to prove it? No. It's the burden of proof of the petitioners who are asking for

the change to prove it. And that is an example of what they failed to do in looking at everybody's business relationship.

Bill Jennings is going to describe, among other things, a piece of land that CSPA owns in the town of Collinsville. We are riparian and have been riparian in our chain of title since -- well, since there was a riparian law.

We're located in a somewhat blessed place because we can figure out what the salinity is every day by going on CDEC. Our use of our land today is that we lease the land to DWR for them to continue the long history of taking water quality samples at their Collinsville station. And Collinsville is one of the three stations that are used for measuring X2.

So that -- but we can't figure out what it's going to be worth 17 years from now when they finish building it. Should we sell it? Is the water quality going to be good? Should we stay there and use the facilities for fishing?

Mr. Jennings will describe the uncertainty of this project and what it does to an individual property owner, even if it's one of the littlest in the Delta because we cannot determine from the evidence we've seen so far whether any of the uses we're contemplating

or that we would sell to people would be worth anything.

And that's the evidence that we believe has failed. And so we will try to describe why they haven't met their burden in the course of our testimony. And that's just about as close as I can get to finished.

CO-HEARING OFFICER DODUC: Thank you, Mr. Jackson. Now we may begin with your direct.

DIRECT EXAMINATION BY MR. JACKSON

MR. JACKSON: Mr. Shutes, before you summarize your evidence, is CSPA 3 a true and correct copy of your qualifications?

WITNESS SHUTES: It is.

MR. JACKSON: Is CSPA 4 revised a true and correct copy of your testimony in this case?

WITNESS SHUTES: It is.

(Protestants' CSPA 2 and CSPA 3 identified for the record)

MR. JACKSON: Would you please summarize your testimony.

WITNESS SHUTES: Good morning. I'm Chris Shutes, FERC projects director and water rights advocate for the California Sport Fishing Protection Alliance. My testimony consists of two parts. One

part addresses reservoir operations; the other part addresses procedural irregularities with the expired water rights permits that petitioners seek to modify. I'd like to begin with the water rights permits.

In its closing brief in the Auburn Dam hearing, the Bureau of Reclamation argued in 2008, contrary to the assertions made at the hearing by California Sport Fishing Protection Alliance and Friends of the River, Reclamation is not requesting that the Board apply a different set of rules and regulations to the federal government.

That was untrue in 2008. It is also untrue of the Bureau today in the case of its Central Valley Project permits, as it is equally today untrue of DWR's permits for the State Water Project.

The permits under which DWR and the Bureau seek to change points of diversion have expired. The Bureau's permits expired 26 years ago, in 1990. In 2009, the Bureau petitioned the Board for extension of time on its permits for the CVP.

On the last day of 2009, about one month short of seven years ago, DWR's permits for the SWP also expired. And on that date, DWR petitioned the Board for extension of time for its permits for the State Water Project.

DWR, in its objection to my testimony for the WaterFix, states that the expired status of the permits that it seeks to modify is outside the scope of the hearing and is thus irrelevant. On its face, it is no more relevant than seeking a visa stamp on expired passport or seeking to sign a construction contract using an expired contractor's license. It is only irrelevant if the jurisdictional agency allows it to be.

CSPA and a number of other entities protested the 2009 petitions for extension of time for both the CVP and the SWP. CSPA's protests remain unresolved. And neither the Bureau nor DWR has made an effort to resolve those protests of CSPA or, to my knowledge, to resolve any other protests. The only communication CPSA has received from the Bureau and DWR regarding resolution of these protests were single responses from each, explicitly directed by board staff.

Notably, the response of the Bureau argues it is impossible to disaggregate the permits for the CVP because the CVP is operated as an integrated whole. Not surprisingly, the response of DWR argues similarly that it is impossible for DWR to disaggregate its permits for the SWP.

The WaterFix petitions build on the

foundations of these earlier procedural irregularities. The WaterFix petition seeks to add points of diversion to permits that expired between 6 years, 11 months and 26 years ago.

If protestants and the Board even know which individual permits are the subject of the petition, we certainly do not know how each individual permit would be modified.

It is my opinion that, if the Board were to approve the WaterFix petitions without addressing the petitions for extension of time, the Board would in fact be granting petitions for extension of time without a hearing and without environmental review.

The petitions for a change in the point of diversion imply greater amounts of water diversion than historical using the new north-of-Delta facilities. This is one of the prime functions of the big-gulp approach. It is inconceivable that the projects would not seek or be allowed to make use of the facilities for which they're designed -- as they are designed.

Granting the WaterFix petitions to modify expired permits with no specificity in accounting as well as applying joint points of diversion to the new points of diversion would create a modular mega-water right that would allow DWR to divert all the water they

can once constraints are met. It would not only be a new water right, it would be a new and unique type of water right.

If the Board does not make the procedural course correction now, the projects will never have to identify the source of their water or demonstrate water availability. If their existing-but-expired permits allow the projects to build the tunnels to suit, there is no reason the projects could not subsequently seek to build storage or other conveyance facilities in another six years or 26 years without seeking a new right for those either.

I now turn to my testimony regarding reservoir operations.

Broadly speaking, the proponent's discussion of how they propose to operate their projects with the WaterFix project in place is not an affirmative description of how DWR and the Bureau would operate to meet all beneficial uses. Rather, it is a description of how they would meet project constraints, principally as required by D1641.

More specifically, proponents do not affirmatively describe reservoir operations. And since there are a very few explicit constraints on reservoir operations, they hardly describe reservoir operation at

all. They tell us reservoir operations won't change, but they don't tell us what is not changing. This does not allow evaluation of existing operation or proposed future operation.

In place of an affirmative objective description of rules and decision points that govern real world operations, the environmental documentation for BDCP WaterFix and the testimony of proponents offer a series of model runs in which the rules for reservoir operations are always the same.

See Exhibit DWR-515, Table 4.

During oral testimony and cross-examination in Part 1A of this proceeding, Mr. Munevar, CalSim 2 modeler for DWR, confirmed the rules for reservoir storage in all four modeled CalSim scenarios for the WaterFix were established in order that they not draw down the reservoirs in comparison to the no action alternative. This is not a boundary analysis for reservoir operation. It treats reservoir operation as a constant, not a variable, even though alternative reservoir operations are not only possible but likely.

Mr. Leahigh, on cross-examination, even suggested possible alternative operation. It is my view that past behavior is a good indicator of future actions. A consistent pattern of past behavior is a

very good indicator of future actions. For this reason, I present Exhibit CSPA 37 that shows actual storage level of major north-of-Delta State Water Project and Central Valley Project reservoirs from 1/24/2007 to 2/28/2008 and from 1/24/2013 to 2/28/2014.

These storage plots show consistent draw down of project reservoirs in periods of relatively high storage to points where the projects were stressed by drought. In the 2014-to-2016 drought, this operation reduced water available for many available uses including water supply.

In my testimony, I emphasize the fact that the testimony of the proponents does not compare the no action alternative with current conditions. In CSPA 36, I reproduce text and also exceedance plots from the RDEIR/SDEIS that showed the early long-term modeling. The revised DEIR shows that, compared to current condition, the no action alternative already anticipates an overall average annual end-of-September storage decrease of 878,000 acre-feet north-of-Delta by 2025.

So whatever the rules that govern WaterFix operations might be, the revised DEIR shows that DWR and the Bureau have already accepted the fact that, by 2025, they will operate their reservoirs north-of-Delta

with a greater element of risk to the tune of about -- of an average of 878,000 acre-feet of reduced carryover. There is nothing speculative about this acceptance of increased risk. It is there in black and white and in color in the proponent's document.

Project proponents ask us to confuse the map and the territory. All their modeling tells us about reservoir operation is that their modelers know how to tell the model how to achieve the same reservoir levels as the no action alternative. They ask us to accept that because they've modeled it one way it will be so, that this one series of model runs is a more reliable predictor of future behavior than their own recent reservoir operation.

The rule curves embedded in CalSim are not binding on project operators. Project operators testify that they use tools other than CalSim to plan operations. They testified that there are no hard numeric carryover storage requirements in their reservoirs and that they oppose establishing such requirements.

The WaterFix facilities would reduce the water cost of exports. Because of this, these facilities will incentivize increased exports both of stored water and of transfer water. The projects will seek to

optimize the value of their projects for water supply. In my work over the past 16 years, it has been my experience that almost every water or power purveyor devotes substantial resources to such optimization as part of its normal business operation.

Based on my experience and my understanding of the CVP and the SWP, I know that demand for project water will always exceed supply. It is my opinion that there will be constant pressure to increase water supply benefits to project contractors and to reduce constraints that limit those benefits. This pressure will come from contractors, from within the Bureau and DWR, from legal representatives, from politicians, and from economic interests that stand to gain direct or secondary benefits to increased water supply.

In short, the California WaterFix would provide opportunities for and incentivize risk, increased risk in the management of the State Water Project and Central Valley project reservoirs. The recent track record in managing carryover storage in the SWP and CVP reservoirs already shows an unacceptable management of risk.

The Board and the legal users of water cannot rely on the judgment and decisions of the DWR and the Bureau in reservoir operations. The California

WaterFix as proposed will not protect legal users of water from injury.

This concludes the summary of my testimony.

MR. JACKSON: Our next witness is Tom Cannon. Mr. Cannon, before you summarize your testimony, is CSPA-7 a true and correct copy of your qualifications?

WITNESS CANNON: Yes.

MR. JACKSON: Is CSPA-8 a true and correct copy of your testimony?

WITNESS CANNON: Yes.

(Protestants Exhibits CSPA-7 and CSPA-8 identified for the record)

MR. JACKSON: Would you please summarize your testimony, sir.

WITNESS CANNON: Yes. My name is Tom Cannon. I'm a retired environmental consultant and have worked on many issues related to the Central Valley Water Project over the past 40 years.

The case for the WaterFix is founded on the assumption that compliance of water quality standards and biological opinions related to the CVP and SWP will protect other legal users of water from injury, yet we do not know what these future constraints will be. It is unreasonable to assume that existing water quality standards requirements will remain in place because

requirements have not protected the beneficial uses. Furthermore, it is likely that constraints on the CVP and SWP to assure protection of fisheries will become more stringent in new biological opinions by the National Marine Fishery Service and the U.S. Fish and Wildlife Service in the update of the Bay-Delta water quality control plan and in other regulatory actions.

The WaterFix has the potential to significantly alter system reservoir storage, reservoir releases, river flows, Delta inflow and outflow, which in turn would potentially affect water supply and quality.

A new OCAP BO will likely have new conditions to further protect salmon in the Sacramento River below Shasta. A probable consequence of these consultations is that less water supply will be available from Trinity and Shasta reservoirs. With a significant reduction in future water supply available from Shasta Trinity, a greater burden will be on Oroville and Folsom Reservoirs to meet water supply demands from the Delta.

Proposed lower net flows below the WaterFix intakes will increase the frequency of high water temperatures in the North Delta and of the Sacramento River.

After June, total exports can be 15,000 cfs from the South Delta as compared to the present limit of 11,400. Outflow during drier years -- which are over 50 percent of the water years -- from uncontrolled runoff flows of the lower Sacramento River tributaries will be reduced measurably by the WaterFix. Such reductions in outflow would occur primarily in winter and spring and would represent a significant impact to the Bay's water quality and beneficial uses.

The WaterFix would have multi-year consequences to all beneficial uses in the Central Valley and the Bay-Delta. The effects will be widespread and significant, involving all aspects of the Valley-Bay-Delta ecosystem including water supply and water quality. Thank you.

MR. JACKSON: Mr. Cannon, as part of your summary, have -- you indicated you worked for -- you worked on Bay-Delta issues for 40 years?

WITNESS CANNON: Yes.

MR. JACKSON: Could you list for the Board the number of organizations by name that you've worked for?

WITNESS CANNON: I started working for PG&E in the late '70s on their power plants in the Delta. And I graduated into work with the State Board, National Marine Fishery Service as a consultant. These were

always in the capacity as a consultant.

I also worked with the Bureau of Reclamation as a consultant and the State Water Project contractors and the other federal water contractors on many issues related to the Bay-Delta. I worked with -- for about five or six years on CALFED in various capacities as a consultant and analyst. And I worked with several firms that did restoration work in the Delta as a consultant, mainly on fisheries habitat issues and fisheries habitat restoration in the Delta and Bay and the river.

And I have worked with the tribes on the Klammath and with other agencies on the Klammath, with Cal Trout. I've worked on many different issues related to Shasta-Trinity and the Bay-Delta water projects. And most recently I've been a consultant and staff support for the CSPA.

MR. JACKSON: Were the opinions that you expressed in the summary of your testimony and in your testimony based upon the knowledge that you gained in working on those projects for those people?

WITNESS CANNON: Yes.

MR. JACKSON: Thank you. Could you go to CWIN. Thank you very much.

Mr. Sjvold, is CWIN-1 a true and accurate

representation of your qualifications?

WITNESS SJVOLD: It is.

MR. JACKSON: Is CWIN-2 Revised a true and correct copy of your testimony?

WITNESS SJVOLD: It is.

MR. JACKSON: Did you also take part in -- in in developing CWIN-3, which I believe has been moved to Part 2, the Santa Barbara Report?

WITNESS SJVOLD: Yes.

MR. JACKSON: All right. I just wanted to reflect that we're not losing CWIN-3. It's just going to the next section.

(Protestants' Exhibits CWIN-1, CWIN-2 and CWIN-3 identified for the record)

MR. JACKSON: Would you summarize your testimony, sir.

WITNESS SJVOLD: Of course. My name is Arve Sjvold. I have a bachelor of arts degree in physics from the University of California 1956 and have 41 years of experience as a practicing research scientist in the fields of rocket engine development, systems engineering, system analysis, operations research, cost analysis, cost estimation, model development, and model application -- excuse me.

I retired with the position of chief cost

scientist from my last employment.

A copy of a statement of my qualifications has been submitted as Exhibit CWIN1. In my testimony, I explained my analysis of Sacramento River runoff and Delta operations with a focus on the indices that govern much of the operations. This analysis is titled "State Water Project And CVP Operations, The Indices That Govern Them And Their Validity," and is presented at CWIN-3 in the revised testimony.

The Bay-Delta Conservation Plan has taken as its mission the twin objectives of improving the reliability of export deliveries and restoration of the Delta.

To meet these objectives, there is a presumed need to capture and control a greater fraction of runoff, which can be timely allocated to Delta restoration and increased exports.

The proposed twin tunnels project has been selected as the best of several alternative projects to accomplish this. The implementation of the twin tunnels project requires a change in the point of diversion from the present point for cross Delta transport. Given that all the available water must originate as runoff from the mountains, it is fair to ask what are the possibilities to capture more water?

The present operations in the Delta are proscribed by a multitude of constraints promulgated by the State Water Resources Control Board in order to protect the rights of others and be faithful to their charge to protect the Delta environment. A seminal element in developing those constraints is the index of water year type.

CWIN began its analysis by investigating the origins and validity of the index water year type. To establish its validity, it was necessary to study the record of runoff from the Sacramento River. That study set out to characterize the statistical properties of the runoff record and how it is used in deriving the water year-type index and its antecedents. The results of that study have revealed some remarkable shortcomings in the present use of those indices.

CWINs findings. The antecedent to the water year-type index is the water year index. The formulation for this water year index was found to be without scientific merit. It has no validity as an index for forecasting a developing water year as to the likely level of runoff. As a consequence, the derivative water year-type index also has no validity. And I will explain this a little bit later.

The Sacramento historical runoff record

comprises two distinct and independent sets: one comprising dry years, which represents 56 percent of the record, and the other comprising wet years of 44 percent of the record.

This is important. There is no meaningful normal or average for the entire record. There is a numeric average, but it is not very meaningful.

There is no significant correlation between successive runoff years such that every water year has to be treated as an independent event. Therefore, at the beginning of each water year, there's a 56 percent chance that it will be dry and a 44 percent chance that it will be wet.

The testimony copy says "46 percent." That should be "44 percent."

A more detailed examination reveals that, if cumulative runoff by the end of January of a water year is less than 3.9 acre-feet as measured by the four rivers index, the possibility of an ensuing wet year is only approximately 5 percent.

Concluding remarks. These findings lead to the following observations and conclusions regarding State Water Project operations and the correlative Central Valley Project operations.

Winter export of project water should be

significantly reduced or deferred until there is enough runoff to indicate that the ensuing water year will be sufficiently wet.

These preliminary findings indicate that could be as late as the end of January. No competent at the same time of project yield can be made at the beginning of a water year. Estimates of the current water yield should be based on the assumption that the ensuing water yield will be dry until there is confidence the water yield will be wet.

Long-term State Water Project operation should be based on a careful examination of the dry year cap of the distribution of runoff to deliver a reliable level of deliveries that the contractors can depend on.

Because most of the CVP is State Water Project reservoirs, operations are tied to water year-type index and that index has been found to be invalid, all such operations must be revisited. Because almost all Delta constraints promulgated by the State Water Resources Control Board are based on water year type all such constraints must be revisited.

That concludes the testimony in CWIN-2.

I would like to go to CWIN-3, which is my exhibit.

MR. JACKSON: Before you do that, Mr. Svjold,

could you explain to the Board how a rocket scientist ended up learning about water indexes?

WITNESS SJVOLD: I happened to begin my career as a research scientist for the development of all of our liquid propellant rocket engines for our strategic deterrent. In that capacity, I was given responsibility for flow measurement. And as a consequence, I was also -- had to do a lot of statistical analysis as we calibrated flow meters and such.

So that began a succession of endeavors on my professional career to move me in the direction of statistical analysis, operations research, and systems analysis. The -- I was -- worked at the Rocketdyne Propulsion field laboratory for six and a half years.

After that, I worked at General Research Corporation, which is a Rand-style think tank in Santa Barbara that was more or less the captive think tank for the strategic air command of our strategic forces. And in that we provided consulting services to the strategic air command as to how to use our nuclear deterrent.

After that, I spent 21 years working as a cost -- an analyst and cost estimator, mostly in military weapons systems but in other things, and

really in the application of operations research and systems analysis.

Along the way, I have had an abiding interest in water resources. It's gone at least for 50 years up till today. I've been retired for 20 years.

And I've taken the tools that I've learned in my profession and applied them. And this is the result of what I have done. And I understand the State Water Project quite well. I understand its modeling very well. And I've always had an interest in why some of these things they use in their models and in the constraints are there. So it's just natural curiosity that led me to this direction. I have the tools to do it.

CO-HEARING OFFICER DODUC: Thank you, but you know, all you need to say, that you are a Cal Berkeley graduate. That would have done it for me.

WITNESS SJVOLD: Thank you.

MR. JACKSON: I do have one more question, though.

WITNESS SJVOLD: Yes?

MR. JACKSON: Mr. Svjold, did you spend time working on the State Water Project EIR relating to the Monterey agreement, the State water contracts?

WITNESS SJVOLD: Yes.

MR. JACKSON: Would you recount how that happened and what you learned?

WITNESS SJVOLD: I was part of one of the plaintiffs on the challenge to the Monterey amendments, which we succeeded in winning. And the Court -- we had a settlement.

The Court wanted the plaintiffs to have a seat at the table in revising the new EIR. And I represented one of the plaintiffs. And that went on for several years and was not supposed to go that long. But in the -- in that activity, I became very familiar with the State Water model CalSim. I have a lot of experience in modeling of just that kind from General Research Corporation. And I worked with some of the best names and network flow modeling. I've talked with the staff of DWR on the model and found out a great deal.

And I always assumed that they were doing good modeling. I'm not so sure that's true now. But I'm not in the position to prove that. But it's a reason that I'm -- really have come to have a great deal of understanding of the State Water Project.

MR. JACKSON: Thank you.

WITNESS SJVOLD: If I may, now, I'd like to go to my Exhibit CWIN-3. And there's several graphics and

the introductory paragraph that I want to present.

MR. LONG: CWIN-3 Revised?

MR. JACKSON: Yes, CWIN-3 Revised, correct.

WITNESS SJVOLD: Revised, yeah.

The -- I reiterate the formulation for the index that was -- the Board has promulgated for designating water year and calculating water year index and, from that, water year type.

The formulation I have there, where I describe the independent variables where I put "Calendar Year," I should have said "Water Year." It doesn't affect anything I say about the formulation.

The importance of that formulation is is that the -- one of the terms depends on the previous water year to develop the index. And it's the weighted by 30 percent. What did I in my investigation was to look at that to see if there really was a relationship between the previous water year and the ensuing water year.

I did a correlation analysis -- actually, more correct, I did a regression analysis of the current water year against the previous water year to see if it had any explanatory power. It did not. Even if I restricted the correlation between the ensuing water year against the previous March, April, July runoff -- which is what is used as a water year index -- there

was no correlation either.

So it was a simple test. Anyone could have done it. And it just shows unequivocally that the previous water year has nothing to do with the ensuing water year, which means that, when you begin a water year, you have no information as to how it's likely to develop. And this formulation here sort of says that we do have information. And it's not true.

So you take this index and they make -- they massage that and categorize five water year types from it. And again, those are in error because the antecedent formula here is wrong.

The next thing as I peruse the record, historical runoff record, was the distribution of the runoff, which is very important. When you are about to make statements of probability of runoff, you must know what the underlying distribution is.

So I looked at that. And Figure B1 is in the second page. It's just a graph of the up and downs of the runoff record over time.

And B2, the next figure down, this is a histogram of that runoff record. And the histogram very distinctly shows two periods of -- two frequent -- two modes to the runoff record. And I tested those statistically, and they are -- they are -- come from

two different populations. They're not -- you can't assume there's one population for runoff. And in fact near the average, which would occur at 18 on the graph, is almost a minimum, which is to say that to quote normal or average as a meaningful statistic of the distribution is incorrect.

So you can take the left hand, the dry year portion as one set and the right-hand portion as another set and treat them separately, and you get some very interesting results.

And I'd like to go to the Page 4 and the graphic shown there. This is a very good graphic. It's a plot of all the points in the record, the runoff, against the sum of December-January flows. In other words, it's -- if we have completed the -- we stand at the end of January and we look at how much flow has accumulated in the river from the four-river index, these are the rim flows, and plot it against the corresponding resulting annual runoff, you'll see that the quadrants, upper left and the lower right, have almost no points in them.

All the points are distributed in the lower left and the upper right quadrants. The lower left, of course, are what we call the dry year set, and the upper right are what we call the wet year set.

And if you draw a line up, the graphic that's so crude, it would be a little after the formulated mark, but it's at 3.9 when you look at the quantitative data, you capture all the dry years except two. And that's where I made the statement that there's only a 5 percent chance that, if you haven't gotten 3.9 million acre-feet, then only 5 percent chance that the year will be wet.

So these are the data that I used and the analyses that I used to arrive at the conclusions and statements I made in my testimony. And I think they're very important. The water year type is a term that is used in all the reservoir operations up and down the project. The reservoir releases are tide to how much is in storage and the water year type. If the water year type is incorrect, you have to revise your reservoir operations.

With regard to the Delta, the water year type is used to designate how much outflow you want. It's part of the in-flow-out- -- export outflow ratios, and basically it's a fundamental parameter in determining the likely effects on water quality. And if that index is not correct, then we have to revise them.

And if we also assume that I'm correct, that each water year has to begin assuming that you're dry,

all the operations have to be revisited on that basis. It also means that, in that critical period of December, January, and February, when you'd like to pump hard to fill the San Luis Reservoir, instead it says that, if you have a dry year, you can't really pump hard until after January. And only that in the instance that the year will be -- ensuing year will be wet.

So it really calls into question how much water there really is available to pursue the twin objectives of Delta restoration and increased export. If we assume that Delta restoration has to make a claim on a certain amount of water, given the results I've shown here, it's going to be very difficult to say that you can even get any more water than you have been for Delta export. The very likely conclusion is that you will have less water.

So this is a very, very important finding for State Water Project.

And I think I'll end my testimony there. Thank you.

MR. JACKSON: The next witness is Jim Brobeck, AquAlliance.

Mr. Brobeck, is AquAlliance 2 -- excuse me.

Is AquAlliance 4 a true and correct copy of

your qualifications?

WITNESS BROBECK: Yes, sir.

MR. JACKSON: Is AquAlliance 3 Revised a true and correct copy of your testimony?

WITNESS BROBECK: Yes, it is.

(Protestants AquAlliance 2 and AquAlliance 3 identified for the record)

MR. JACKSON: Would you please summarize your testimony, sir?

WITNESS BROBECK: I'd be happy to.

I own an acre of land in the Chico urban area that is served by a 70-year-old well. This hundred-foot-deep well provides domestic water for two families, a family orchard and vegetable garden. Maintaining a useable elevation of groundwater under my land is of the utmost importance to maintaining our domestic water supply, irrigating our modest agricultural pursuits, and sustaining 23 valley oak and live oak trees that provide a cool canopy of shade during the hot summer and fall months.

I serve AquAlliance as a water policy analyst and have worked closely with our executive director for over 12 years. AquAlliance represents independent groundwater users in the Northern Sacramento Valley by

tracking regional water projects, by participating in NEPA and CEQA process, and by engaging with the Butte County Water Commission and the Northern Sacramento Valley Integrated Regional Water Management Plan.

I was appointed by Butte County Supervisor Kim Yamaguchi to serve on the County's water advisory committee.

The WaterFix fails to clearly identify threats to the balanced Northern Sacramento Valley aquifer system, threats presented by the emerging water market that intends to employ groundwater substitution water exports to fill the giant tunnels that require this diversion change petition. Many wells in my region register historically low elevation. Numerous monitoring wells have failed to comply with Butte County's basin management objectives.

These monitoring objectives have no enforcement mechanisms. There are a number of areas that have a steady decline in groundwater elevation, even during so-called normal water year conditions. In other words, existing demands on the aquifer system are creating an unsustainable aquifer imbalance that will impact groundwater-dependant family farms, urban forests, stream flow volume and thereby depriving people downstream that have longstanding rights to

divert surface water.

The WaterFix will require sources of reliable supply water to fill the tunnels. One of the buzz words for where this water will come from is "conjunctive use." Conjunctive use of groundwater by senior irrigation districts in the Sacramento Valley has been used as tool of flexibility by surface water exporters and is synonymous with groundwater substitution exports.

My family's shallow well is indicative of a resource that has been the foundation of the quality of life for the residents of my region. Many independent family farms use the shallow aquifer as a source of irrigation water to keep their trees producing fruit and nuts. Intermittent stream tributaries of the Sacramento River were wetter for longer periods prior to the development of groundwater infrastructure.

According to Dan Wendell, a Nature Conservancy spokesman, quote, "The Sacramento Valley still has water levels that are fairly shallow. There are numerous perennial streams, and the basin is largely within a reasonable definition of sustainable groundwater yield. However, since the 1940s, groundwater discharge to streams in this area has decreased by about 600,000 acre-feet per year due to

groundwater pumping. This is stream flow that would have otherwise ended up in the Delta. Our current estimates are that 400,000 acre-feet per year is lost to export capacity. This represents a very real decrease in the yield of the Central Valley Project and the State Water Project. Surface water rights impacts occur very early in groundwater development, when modest water level declines of only 20 to 40 feet can result in significant depletion of stream flow," end quote.

So the Nature Conservancy analysis indicates that increased demand on the aquifer can decrease surface water flows and thereby cause injury to people that have longstanding rights to divert surface water. Humans have unwisely developed massive groundwater extraction infrastructure before installing prerequisite monitoring infrastructure.

Conjunctive water use in the Sacramento Valley basin as envisioned by the willing sellers, by the USBR, and by the DWR to fill the Fix tunnels is demonstrably premature.

The WaterFix is designed to eliminate constraints on Delta export pumping. These constraints have reduced opportunities for the willing sellers of Sacramento Valley water to export water to the willing

buyers south of the Delta.

The USBR long-term water transfer program plans to export up to 600,000 acre feet of water with groundwater substitution over one half of that amount. Implementing the WaterFix will increase opportunities for irrigation districts to participate in these groundwater substitution water sales. Creating water export infrastructure prior to implementing prerequisite shallow aquifer baseline and monitoring infrastructure can result in damage to existing users.

The fact is this is a giant project that requires detailed analysis of the source of the water, which is the Sacramento Valley watershed. In 2007, water experts from DWR, NAQA, and elsewhere drafted the Sacramento Valley Water Resource Monitoring Data Collection and Evaluation Framework, which explains, quote, "In order to identify impacts associated with potential changes in water management practices, a program-specific network of shallow monitoring wells must be developed to detect changes in water levels over the shallowest portion of the aquifer," unquote.

These monitoring requirements, known by experts for almost ten years, have not been implemented anywhere in the Sacramento Valley watershed, the area of origin of the water that would fill the Fix tunnels.

The prerequisite groundwater management monitoring protocol must be implemented prior to the elimination of export constraints associated with a petition to change the points of diversion.

This concludes the summary of my testimony.

MR. JACKSON: Thank you, sir.

CO-HEARING OFFICER DODUC: Mr. Jackson, before you move on, I do need to take a break for the court reporter. So now would be a good time. We will reconvene at 10:30.

(Recess taken)

CO-HEARING OFFICER DODUC: Okay. If everybody could please grab a seat, it is 10:30, so we are reconvening.

Mr. Jackson, please take your next witness.

MR. JACKSON: Thank you very much. The next witness is Barbara Vlamis.

Before you summarize your testimony, Barbara, is AquAlliance 1 Revised your testimony in this case, a true and correct copy of your testimony in the case?

WITNESS VLAMIS: Yes, it is.

MR. JACKSON: Is AquAlliance 2 a true and correct copy of your qualifications?

WITNESS VLAMIS: Yes.

MR. JACKSON: Would you please summarize your

testimony.

WITNESS VLAMIS: I am the executive director of AquAlliance and have 25 years of experience in environmental advocacy and education. AquAlliance is a not for profit California corporation that was formed 2009. Its mission is to defend the Northern California waters and the ecosystems these waters support and to challenge threats to the hydrologic health of the Northern Sacramento River watershed, including escalating attempts to divert and withdraw more water from the Northern Sacramento hydrologic region.

AquAlliance members are legal users of water that include farmers, scientists, businesses, educators, and residents who have significant financial, recreational, scientific, esthetic, educational, and conservation interests in the aquatic and terrestrial environments that rely on the waters of the Sacramento River Watershed. The hydrologic system of ground and surface waters provide water for orchards, homes, gardens, businesses, wetlands, streams, rivers, terrestrial habitat, and myriad species which in turn allows AquAlliance members to reside, farm, fish, hunt, cycle, photograph, camp, swim, and invest in the economy of the region.

The no injury rule requires that the

petitioners demonstrate that these users will not be harmed by the petitioner's proposal. In economic terms, injury would occur as cost increase or benefits decrease.

My testimony includes examples of higher costs and decreased benefits to legal users in the Sacramento Valley and foothills that could easily take place if the twin tunnels are built.

The petitioner's project provides a longer transfer window than allowed under current regulatory constraints. In addition, the facility provides conveyance that would not be restricted by Delta reverse flow concerns or South Delta water level concerns. As a result of avoiding those restrictions, transfer water could be moved at any time of the year the capacity exists in the combined cross-Delta channels, the new cross-Delta facility, and the export pumps, depending on operational and regulatory constraints including BDCP permit terms.

That is -- that is language from the agencies themselves. Excuse me. I didn't start with the quote and end quote.

The supplemental and recirculated environmental documents also acknowledge that the project would deliver less water south of the Delta,

and preferred Alternative 4A, quote, "would increase water transfer demand compared to existing conditions," end quote. The project document also demonstrated that past transfers have taken place in all kinds of water year types when SWP and CVP south of Delta contractors received allocations of myriad kinds.

The source of water that is integral to the project was mentioned but not analyzed in the environmental review documents. Appendix 5C revealed that there is the potential to transfer up to 1 million acre-feet per year with 400,000 acre-feet coming from groundwater substitution transfers.

Additionally, internal BDCP communication indicated that the purchase of approximately 1.3 million acre-feet of water is being planned as a means to make up for the flows that would be removed from the Sacramento River by the tunnels.

As mentioned above, AquAlliance represents many residents, businesses, and farms that depend on the health of the Sacramento River foothill and valley watershed.

The Central Valley Project and State Water Project-impacted counties presented in my testimony are where water selling water districts are prominent. As you will see, the majority of the population depends on

groundwater for its personal and economic uses.

The impacts from the project to the many thousands of people in the Sacramento Valley are not disclosed or analyzed because the applicants have separated the project from the source of the water for the project.

Some examples: Butte County has an estimated population of over 224,000 people. There are over 12,000 domestic wells alone in Butte County and approximately 2500 irrigation wells. The Chico urban area is the largest urban area north of Sacramento with a population of approximately 102,000 people. The majority of wells used in Butte County and throughout Sacramento Valley are individual wells that pump from varying strata in the aquifers. The thousands of domestic wells in the project source area are vulnerable to groundwater manipulation and lack historic monitoring.

The Bureau's 2009 drought water bank environmental assessment elaborated on this point regarding Natomas Central Municipal Water Company, stating that, quote, "Shallow domestic wells would be most susceptible to adverse effects. Fifty percent of the domestic wells are 150 feet deep or less. Increased groundwater pumping would cause localized

declines in groundwater levels or cones of depression near pumping wells, possibly causing effects to wells within the cone of depression," end quote.

In addition, a number of groundwater-dependant farmers in Butte County who have deeper wells have told me that the escalating cost to maintain rehabilitate and at times drill new wells will eventually put them out of business.

Could we look at Page 2 of my PowerPoint? It's Exhibit 69.

This Page 2 will show you what's been going on -- that -- yeah. The trajectory of deep well applications in Butte County, you can see, it has shot off the roof in 2014 and 2015, and I wanted to bring that to your attention.

In Colusa County there's an estimated population of almost 22,000 people. Their largest city of Colusa has approximately 6300 people. There are 1337 domestic wells, 57 public supply wells, and 1131 irrigation wells in Colusa County to date.

In Glenn County, with an estimated population of 28,668, their largest city of Orland has a population of 7676 people.

The City of Willows has a population of 6154. There are 2,923 domestic wells, 34 public supply wells,

and 1849 irrigation wells in Glenn County to date.

Shasta County has an estimated population of 170- -- almost 179,000 people. Its largest city is Redding with a population of over 90,000 people. There are 11,253 domestic wells, 219 public wells, and 363 irrigation wells in Shasta County to date.

And Tehama County has an estimated population of almost 64,000 people. Its largest city is Red Bluff with a population over 14,000. Red Bluff is bifurcated by the Sacramento River. And from one of its flood control reports in 2003, it states, quote, "Groundwater used for irrigated agriculture increased to two thirds of the irrigated agricultural supply in the '90s and continues at a similar rate to the present day. Other factors have also contributed to an increasing reliance of groundwater, including local and statewide population growth, changing land use patterns, increased environmental water use, and water supply reliability. Increased municipal and industrial uses within the county rely almost entirely on groundwater as a water source," end quote.

In Tehama County, there are over 10,000 domestic wells, 111 public supply wells, and 15,091 irrigation wells to date.

Transfers or exports from the Sacramento

Valley that directly or indirectly involve groundwater have the ability to increase harm to the groundwater basins and therefore all the human uses that depend on groundwater.

Declining groundwater elevations lead to higher costs for extracting well water, well maintenance, well replacement, and watering household, municipal, and agricultural vegetation or crops. Direct and indirect groundwater impacts also lead to stream and river accretion that leads to declines in surface flows that cause impacts to other surface water and groundwater users and uses.

Briefly on water quality, there are a number of pollutants in the Sacramento Valley groundwater basins that have considerable potential to affect public health. The WaterFix testimony failed to consider that increased groundwater extractions for water exports might mobilize constituents PCE, TCE, and nitrates under the City of Chico, mobilize arsenic and iron in domestic and public wells in part of Tehama County where 14 percent of the wells had concentrations of both arsenic and iron above their associated NCL levels.

One missing -- another missing item are the conditions of groundwater. Could we go to Page 1 of

the PowerPoint as I read my -- thank you.

The WaterFix ignores the watersheds that will provide the water for the twin tunnels. What you also know is that many California counties and communities have serious historic groundwater declines, more recent significant groundwater declines, or both including in the source areas.

Sacramento Valley groundwater is experiencing the most serious and persistent decline since the CVP and SWP projects were built. And this can illustrate it. I won't read it to you.

Despite this fact, DWR has provided a comprehensive assessment of groundwater overdrafts in California for 35 years. Undaunted by such a dirth of information, DWR produced an estimate in 2003 that quote, "Overdraft is estimated between 1- to 2 million acre-feet annually," end quote, in California.

The Petitioner USBR acknowledged these errors of omission in their own document recently, the 2015 Coordinate Long-term Operations of the Central Valley Project and State Water Project Draft EIR and FEIR -- FEIS, excuse me. Significant concerns about fall 2015 groundwater levels were summarized in the Northern Sacramento Valley Integrated Regional Water Management Board meeting. Quote, "Bill Ehorn," who is the chief

of groundwater section in the northern region office of DWR, "gave an update on groundwater levels within the North Sac Valley region. Change maps for October groundwater levels show that, in much of the northern valley, the groundwater levels are lower than 2011, going from bad to worse. Historic groundwater level hydrograph maps show that groundwater levels are at their lowest ever on record. A wet winter will help the water tables rebound, but deeper aquifers will take longer to rebound," end quote.

Subsidence. The applicants are well aware of subsidence issues in the Sacramento Valley, although it has not been disclosed nor have the potential subsidence impacts from the project been analyzed. The WaterFix project proposes up to 400,000 acre-feet of groundwater substitution transfers, as I mentioned above, in the very region experiencing the subsidence. Relevant information regarding subsidence from other documents produced by the applicants includes, quote -- this is from the Final EIS/EIR for the long-term water transfers.

"Land subsidence has not been monitored in the Redding groundwater basin; however, there would be potential for subsidence in some areas of the basin if groundwater levels decline below historic low levels.

The groundwater basin west of the Sacramento River is composed of the Tehama formation. This formation has exhibited subsidence in Yolo County and the similar hydrologic characteristics in the Redding area groundwater basin could be conducive to land subsidence."

Next quote.

Out of the 11 DWR extensometers, five show potential subsidence over time. And I will summarize this, not give you the entire quote. But near the Conway Ranch in Yolo county, they observed inelastic land subsidence estimated at approximately two tenths of a foot from 2012 to 2013 and an additional six tenths of a foot from 2013 to 2014.

In comparison, slightly less than one tenth of a foot of subsidence occurred over the previous 22 years, so in the last few significant changes.

In Yolo County near Yolo Zamora, half a foot decline from 92 to the present. Quote, "Historically land subsidence occurred in the eastern portion of Yolo County and southern portion of Colusa County due to extensive groundwater extraction and the region's geology. The earliest studies on land subsidence in the Sacramento Valley occurred in the early '70s when the U.S. Geological Survey in cooperation with DWR

measured elevation changes along survey lines concerning first and second order benchmarks. As much as four feet of land subsidence due to ground water withdrawal occurred east of Zamora over the last several decades. The subsidence in this region is generally related to groundwater pumping and subsequent consolidation of compressed clay soils," end quote, also from the 10-year water transfer Final EIS/EIR.

Glenn County is starting to see some subsidence in the order of about four inches. It used -- they had not seen that for many, many decades, but they are now observing the beginning of subsidence in Glenn County.

Added to this is personal experience by a farmer I know in Glenn County. Here is his direct language. "My grandmother's historic brick-and-beam ranch style house started cracking three years ago after 60 years of none. In the confluence of the GCID pumps, subsidence has dropped one of my well pads. A 30-year-old PVC pipeline buried five feet deep decided to shift and break for no reason this spring. I am facing immediate replacement of at least three wells. The local farmers in the area of GCID's influence have all been paying more money for the same water. Water quality changes in two of my other wells have cost me a

fortune this year to keep the system clean. I believe it's because of GCID's drawing down the aquifers."

Lastly, on the topics before my conclusion, it's -- I wanted to speak about groundwater age and recharge.

Notwithstanding the absence of disclosure in WaterFix documents regarding the age of groundwater or recharging the Sacramento River watershed, research by the academic community exists. For example, according to Professor Jean Moran regarding the mid Sacramento Valley, quote, "Wells with top perforations below 300 feet below ground surface do not contain tritium. The large volume of old groundwater produced at drinking water wells has implications for groundwater management since recharge to these wells take place over periods greater than 50 years. Relatively rapid groundwater flow is limited to the shallow regime in localized areas near the major streams and in fan sediments," end quote.

Dr. Moran's groundwater ambient monitoring assessment report also demonstrated that, except for fairly rapid recharge near streams in Chico, quote, "Drinking water wells that back up to the foothills to the east and wells to the north of Lindo Channel produce almost exclusively pre-modern groundwater," end

quote. This was also the case for, quote, "deep monitoring wells especially to the west of Sacramento River that produced paleo water that recharged more than 10,000 years ago."

Dr. Hoover from Chico State stated, quote, "This implies that there is currently no active recharge to the lower Tuscan aquifer system." She continued by stating, "If this is the case, then water in the lower Tuscan system may constitute fossil water with no known water recharge mechanism, and once it is extracted, it is gone as a resource," end quote.

Could you go to Page 4.

And as you're --

CO-HEARING OFFICER DODUC: And as you're doing that, Mr. Jackson had requested I think about two, two and a half hours for his direct. So let's add another 60 minutes. The clock wound down quite a while ago.

WITNESS VLAMIS: This is my conclusion.

MR. JACKSON: She hasn't stopped you. She knows how to do that.

CO-HEARING OFFICER DODUC: I just want to get the clock going again.

CO-HEARING OFFICER MARCUS: That was the longest wait after a beep I've seen.

CO-HEARING OFFICER DODUC: Yes, I didn't want

to interrupt her.

WITNESS VLAMIS: And if you'd go then also to No. 5, I brought these visual representations of how the people in our region feel because words are one thing, visual representations cut through a lot of the hyperbole. So I wanted to bring these, done by professionals for the Sacramento Bee, to illustrate how many people in Sacramento Valley feel.

As demonstrated in our testimony, there's a great deal omitted from the WaterFix documents and the applicant's testimony on which you must rely for this petition. It is as if where the water comes from has no meaning, as if the Sacramento Valley and Foothill people, farms, and businesses that all depend on the water that supports the human and natural landscapes, as if they're not there.

Until the applicants are challenged here and in court, they will ignore the water, the land, and the people that will be sacrificed for the dreams of three governors, numerous speculators, and less than 2 percent of the north state population that stands to make money mining water.

But don't we all know where the water is coming from? Where is the infrastructure to move water -- a crop that is easily fallowed and large

groundwater basins and sellers with a pattern of water sales. We know it's the Sacramento Valley.

AquAlliance and our colleagues have done all we can in responding to project documents, attending meetings, and participating in the State Water Board WaterFix hearing. So far, we feel we have not been heard. It is as if we were not part of California, as if our watershed, California's largest, has an endless supply of water, as if you can trick not only people but hydrology.

And because the Sacramento watershed would wither and die like the watersheds of San Joaquin and Owens Rivers in someone else's lifetime, should we not care? Should you not care? For as goes the Sacramento River and its watershed, so goes the State of California. And if you do not hold the applicants accountable for their errors and omissions, the public will be forced to fill your shoes in a court of law.

I'm completed.

MR. JACKSON: Ms. Vlamis, you filed a substantial number of exhibits in this case.

WITNESS VLAMIS: Yes.

MR. JACKSON: Why?

WITNESS VLAMIS: Because they are illustrative of what is lacking in this project, what is lacking in

the applicant's submittals, their documents that they've used for environmental review. They cover the issues that are sadly missing that I tried to summarize in my -- in my comments here.

MR. JACKSON: Are these documents the documents that you relied on for your testimony?

WITNESS VLAMIS: Absolutely.

MR. JACKSON: Are these documents mostly government documents?

WITNESS VLAMIS: Yes, absolutely. There are some that are academic, but mostly -- or they're water district too. I would say the private ones could be water district.

MR. JACKSON: Are these documents the kind of material that you and others rely on for their knowledge and understanding of the systems that your region depends on?

WITNESS VLAMIS: Absolutely.

MR. JACKSON: And you believe they're relevant to your testimony?

WITNESS VLAMIS: It would be very difficult to provide this kind of testimony without them.

MR. JACKSON: Thank you.

Could you scroll down so I can find Mr. Custis.

WITNESS VLAMIS: He's up.

MR. JACKSON: Oh, up. Okay. Sorry, wrong direction.

Mr. Custis, is AquAlliance 6 a true and correct copy of your qualifications?

WITNESS CUSTIS: Yes.

Yes, yes.

MR. JACKSON: Is your microphone on?

WITNESS CUSTIS: Yes.

MR. JACKSON: You're going to have to keep your voice up for the broadcast and everybody to hear.

Is AquAlliance 5 a true and correct copy of your testimony?

WITNESS CUSTIS: 5 is a copy of the written testimony.

MR. JACKSON: Yes.

WITNESS CUSTIS: And then from AquAlliance, 17 to 33 are the exhibits that are attached to that testimony.

MR. JACKSON: And they're attached to the testimony for what reason?

WITNESS CUSTIS: Some of them are back-up information that I derived in my opinion on the testimony for this hearing.

MR. JACKSON: And they are the material from

which you composed your testimony?

WITNESS CUSTIS: Yes.

MR. JACKSON: Thank you. And is AquAlliance 7 a true and correct copy of your PowerPoint?

WITNESS CUSTIS: What happened the Power Points is many of the exhibits god asked erred so they're in the from 8 to 32 if you open up PowerPoint 7 it's just a few slides.

(Protestants Exhibits AquAlliance 5 and 7 identified for the record)

MR. JACKSON: All right. So would you please summarize your testimony?

WITNESS CUSTIS: Okay. My name is Kit Custis, the purpose of my testimony is to provide information on the groundwater and surface water resources in the Sacramento Valley and Delta and the potential impacts to groundwater and surface water users from changing the point of diversion proposed by the WaterFix project.

The WaterFix project testimony and environmental documents have made it clear that the project will increase the volume and frequency of exporting upstream area transfer waters under Delta and provide longer export times than allowed under the current regulatory constraints.

The WaterFix project's purposes is to capture surface water and groundwater from the Sacramento Valley and convey that water under the Delta to export to service areas.

The testimony of the proponents of the WaterFix project doesn't provide adequate analysis with sufficient remedy to address the project's impacts to surface water and groundwater users in the Sacramento Valley and Delta.

The specific issues all addressed in my testimony include the fact that the WaterFix project's impacts to the Sacramento Valley and Delta groundwater and surface water systems have not been fully evaluated for the proposed maximum export of up to 400,000 acre-feet per year using groundwater substitution transfers and up to 507,000 acre-feet per year using crop idle transfers.

The fact that the current default Bureau of Reclamation one-year, 12 to 13 percent stream depletion correction factor provided as mitigation for surface water impacts from exports that result from ground water substitution pumping is inconsistent with the science on the interactions between surface water and groundwater and has been disproven by Sacramento Valley groundwater models -- modeling studies conducted by DWR

and for Sacramento Valley water agencies.

Can I get Aqua Exhibit 18?

MR. JACKSON: Mr. Custis, we're -- the court reporter is taking down your words. So would you be mindful of speaking slowly enough -- although she's very fast, but don't get -- don't get beyond it.

WITNESS CUSTIS: This is a graph that shows DWR groundwater model results from C2V SIM that's a model name. And shows that, in the last 90 years of groundwater use in the Sacramento Valley, there has been a consistent linkage between increases in groundwater pumping and increases in the loss of surface water flow.

On the left-hand side of this graph is a -- is the groundwater pumping. Numbers on the right-hand side -- the right-hand side is what's call accretion. Accretion is surface ground -- groundwater discharges to surface water is called accretion. When accretion is negative, it represents surface water losses to groundwater or stream depletion.

Based on DWR's modeling, the longterm rate of decrease in groundwater accretion is nearly equal to the long-term increase in groundwater pumping, as shown by the straight green lines that slope at equal but opposite angles on Aqua Exhibit 18.

Aqua Exhibit 18 shows that the surface flows in the Sacramento Valley and Delta have decreased approximately 1.4 million acre-feet since the 1920s. That's the right axis of the graph.

At the same time, the Sacramento groundwater pumping has increased approximately 2 million acre-feet. That's the left axis.

DWR's model results show that the loss of surface water flows range from approximately 70 to 80 percent of the volume of groundwater pumped, which contradicts the Bureau of Reclamation's one-year, 12 to 13 percent stream depletion correction factor.

Aqua Exhibit 21.

I think if you can rotate it and then just zoom in on the graph on the lower right corner -- of the corner. Yeah, that one.

The long-term stream depletion rate of 70 percent of the pumped groundwater volume was also demonstrated in a 2010 CH2M Hill study on the impacts from the 2009 Sacramento Valley transfer exports. I've selected points on this graph that give you the percentage of stream depletion for different times and then Aqua 22.

You'll to have rotate it to the right. Yeah.

Selected points from the CH2M Hill 2009

cumulative stream depletion graph of groundwater pumped during the transfer export operations from -- its Aqua Exhibit 21 -- were plotted on a graph of two ideal stream depletion response curves developed by Jenkins.

To plot the CH2M Hill 2009 stream depletion response curves on the Jenkins graph, the data were adjusted using an effective Jenkins stream depletion factor of 2.4 years. The time on the 2009 depletion volume on Aqua Exhibit 21 was 28 percent.

The CH2M Hill stream depletion response curve agrees with DWR's model results. The 2009 curve gives the time to reach 70 percent depletion at approximately 95 years by taking 70.7 and going across to the equation 2, which is the purple -- well, no, actually the dashed line. It's about 40 on the X axis. And that -- multiplying that by the 2.4 years, which is the Jenkins stream depletion factor, comes out to 96 years.

So the two models agree on a loss in surface flow due to groundwater pumping.

The CH2M Hill 2009 response curve also shows that the time needed for the groundwater system to achieve 90 percent recovery are residual stream depletion following one year of transfer pumping is greater than 200 years. We're out here at 90 percent. It's -- basically this is six times. So 600 times 2.4

years. That's greater than 200 years. That assumes surface waters are available as a source of groundwater recharge.

The two modeling study results show that the current Bureau of Reclamation 12 and 13 percent stream depletion correction factor won't mitigate approximately 60 to 70 percent of the loss of surface flows that result from groundwater substitution transfer exports.

Recovering a loss to groundwater storage from transfer exports will take decades. Corresponding losses in surface flow will continue until groundwater storage recovers.

Aqua Exhibit 14.

I think you need to rotate it to the right again, and then in the upper right-hand corner, the first block of numbers.

Okay. Pumping ground water for transfer exports will create an additional 211,000 to 246,000 acre-foot loss in the groundwater storage over the current loss of 330,000 acre-feet per year. And that's the number that's in the third column from the right, "Changing Groundwater Storage." And that's for Sacramento Valley. That's 2000 to 2009 annual loss.

The losses in surface water flow -- that's a

78 percent increase in the loss of groundwater storage annually.

The loss of surface water flow from groundwater pumping for export will be an ongoing impact to the water rights of surface water users, both riparian and appropriative and, in particular, during summer months. Crop idle transfer exports will similarly cause a loss in groundwater storage because the deep percolation recharge that accompanies irrigation from surface water will be lost.

The amount of lost groundwater recharge will depend on how much of the applied water deep percolates. The loss of groundwater storage will be some fraction of the 507,000 acre-feet per year exported using crop idling.

Aqua Exhibit 20.

Again, you have to rotate.

The increase in groundwater storage loss from transferred exports will result in a decrease in groundwater elevations. The average number of domestic wells that have been impacted by decreases in groundwater elevation from the Bureau of Reclamation's 10-year transfer program exports is approximately 17,500.

This should be assumed that this number of

wells impacted by the WaterFix proposed increase in groundwater substitution and crop idling transfer exports will be at least if not greater than the number from the Bureau of Reclamation's ten-year program.

Lowering the groundwater levels can cause increase in pumping cost and may result in lost wells as water levels fall below the total depth of many domestic wells.

Aqua Exhibit 27.

Yes, that's it. The Sacramento Valley portion of that is fine.

Groundwater modeling by DWR has also shown that the Sacramento Valley and the Delta groundwater system are hydrologically interconnected. This interconnection has resulted in increased flow of groundwater away from the Delta towards the areas of greatest groundwater pumping. The Delta region in the figure is Sub Region 9.

MR. JACKSON: Mr. Custis, can I ask you a question there?

WITNESS CUSTIS: Sure.

MR. JACKSON: At this point, you were saying that the whole Sacramento Valley groundwater system and -- is connected to the Delta system; is that right?

WITNESS CUSTIS: Yes. Ultimately, they're

connected at the --

MR. JACKSON: And this is DWR's information?

WITNESS CUSTIS: This is the C2V SM simulations on interbasin flows from the DWR's modeling of the Central Valley. It's in their --

MR. JACKSON: It's been published?

WITNESS CUSTIS: -- published, reported. The reference there is -- I think it's the final report for that in 2013.

MR. JACKSON: And did I just hear you say that the groundwater is now moving away from the Delta?

WITNESS CUSTIS: Yes, if you look at the -- the Delta Sub Region 9 in this figure, and the arrows are mostly moving away. There's a small arrow from -- I think 6 is Colusa and Yolo coming into the Delta. But most of it is heading away, a lot of it going to the Sub Region 8, which is sort of a mixture of Sacramento area and, you know, Lodi area. That's called "eastside streams."

MR. JACKSON: Thank you. I'm -- I didn't mean to interrupt you.

WITNESS CUSTIS: That's okay.

The Sacramento Delta has been hit the hardest of all the DWR-modeled Sacramento Valley sub regions over the last 40 years with the current loss of

freshwater to the neighboring sub regions at an annual rate that's at least twice what it was in the 1960s. It was actually -- there's a figure in here which I didn't include, the 81-A, which actually shows water draining to the Delta in the '20s. So the amount of loss that's in one of my other exhibits here is in the hundreds of thousands of acre-feet.

But since the '60s, you've doubled the amount of water lost to the surrounding areas.

MR. JACKSON: Since the '60s you said?

WITNESS CUSTIS: Yes.

MR. JACKSON: Do you find it a coincidence that that's when the State Water Project went into operation?

WITNESS CUSTIS: Well, I think it probably -- have to look at the loss between 2020 and the '60. I think without the State Water Project, you might have had even more of a loss as people were depending more on groundwater.

MR. JACKSON: Okay.

WITNESS CUSTIS: All right. Lowering the groundwater levels in the Sacramento Valley and Sub Regions Nos. 1 through 8 as a result of the proposed groundwater substitution and crop idle exports through the WaterFix tunnels will increase the groundwater

gradient away from the Delta in part due to the reduction in the surface flows available to recharge the Delta's groundwater aquifer systems and because the Delta's groundwater levels are controlled by Suisun Bay and will therefore remain at sea level and higher than the surrounding sub regions.

Aqua Exhibit 28.

This is a map from the spring of 2016 taken off the DWR's website about what the groundwater contours are in areas surrounding the Delta. And what's of note here is that the red line that's on this -- these contours to the right, that's sea level. That's zero. And everything in between is below sea level.

An increase in the groundwater gradient to the east and northeast of the Delta from the WaterFix groundwater transfer pumping will move additional Delta water, fresh water, towards areas where ground level elevation are below sea level and the sub areas of Sacramento and Placer County, which are Sub Regions 7 and 8 on the previous graph. The 10-year transfers now propose 62,000 acre-feet per year to be transferred out of Sacramento and Placer County areas.

The loss of freshwater in the Delta will be replaced by saline water of Suisun Bay which will make

the Delta groundwater unusable for agriculture and only using to domestic purposes with treatment to remove salinity and other harmful minerals.

In summary, the WaterFix project will result in an increase in surface water and groundwater transfer exports from the Sacramento Valley that will result in increases in ongoing annual losses of surface water flows by approximately 70 to 80 percent of the volume of groundwater pumped.

The exports will also significantly increase the loss of groundwater storage over the current condition. And the loss will take decades to recover.

The ongoing loss of groundwater storage will result in significant long-term impacts to groundwater levels and surface water flows in the Sacramento Valley and the Delta which will negatively impact both surface water and groundwater users by reducing available water and by increasing the cost of water use. The testimony of the proponents of the WaterFix project hasn't provided an evaluation of these long-term impacts to the Sacramento Valley and Delta water resources and water users.

The existing short-term Bureau of Reclamation 12 to 13 percent stream depletion correction factor is inadequate to address the long-term losses of surface

water flows resulting from the WaterFix project exports. That's the conclusion.

MR. JACKSON: Mr. Custis, would you briefly, for the record, go through your employment history in regard to groundwater.

WITNESS CUSTIS: My employment history? Okay. Sorry. How long ago? I've been a --

MR. JACKSON: Not every year. Okay.

WITNESS CUSTIS: I've been a geologist, professional geologist, practicing geologist since 1977, and I've worked in consulting industry probably in ten of those years.

I spent 23 years working for the State of California. I worked for State Water Board. I worked for the Central Valley regional board, and I worked for Department of Conservation. And I retired from the State in 2006. I now work part-time for myself. I also do some work for part-time for a private consulting company that's more of a planning company that does EIRs, documents.

And then I occasionally work part-time for Fish and Wildlife on groundwater issues -- as retired annuitant.

MR. JACKSON: And you are a licensed geologist?

WITNESS CUSTIS: I'm a licensed geologist, a licensed certified engineering geologist and certified hydrogeologist in California, and only geology and engineering in Oregon.

MR. JACKSON: Thank you, sir.

Our next witness is -- I'm back to CSPA.

Dr. Lee, is CSPA 5 a true and correct recital of your resume?

WITNESS LEE: Yes, it's a summary of it.

MR. JACKSON: Is CSPA 6 -- excuse me -- CSPA 6 Revised a true and correct copy of your testimony?

WITNESS LEE: Yes, it is.

(Protestants' Exhibits CSPA 5 and 6 identified for the record)

MR. JACKSON: Would you summarize your testimony, sir?

WITNESS LEE: First, with respect to my --

MR. JACKSON: At the start, though, would you please summarize your educational background and your connection with the Delta for the record?

WITNESS LEE: Yeah. I've been involved in water quality evaluation since 1960, when I got my Ph.D. from Harvard University in environmental engineers. For 30 years, I held university graduate-level teaching and research positions at

several major U.S. universities across the U.S.

This resulted in about $5 million in research and close to 500 papers and reports. Almost all of this work is in conjunction with my wife, Dr. Ann Jones Lee, who's behind here and really the principal behind what we've proved to be a key issue in the evaluation that we're making today.

With respect to the -- let's see. I need to advance the slides now. You want to go to my slides?

MR. LONG: Of your testimony?

WITNESS LEE: Yes. The PowerPoints.

MR. OCHENDUSZKO: Mr. Jackson, do you know the --

CO-HEARING OFFICER DODUC: 56 Revised.

MR. JACKSON: Thank you.

WITNESS LEE: All right. Basically what I want to today is my experience in evaluating water quality issues in the Central Delta. And this is going to be the basis for my comments on how the proposed WaterFix diversions through the tunnels will be significantly adverse to water quality in the Central Delta.

Go to the next slide, please.

Following up on the DWR USBR assessment of the water quality beneficial use impacts of the proposed

WaterFix changes.

Basically, DWR and USBR asserted that you can divert up to 9,000 cubic feet per second of Sacramento water at the North Delta intakes and not have significant adverse impacts on Delta water quality.

As someone who's been involved in Delta water quality -- and I'll summarize this in just a minute -- since 1989, I was shocked to see this statement being made by DWR and USBR based on an assessment of only review of the changes in water quality and water level use, focusing on very narrowly defined D1641 salinity for part of the Delta and chloride for a very limited area of the Delta.

Not considered in this assessment is a wide range in existing potential pollutants impairing water quality and beneficial uses in the Central Delta.

Next slide, please.

In order to understand what should have been examined by USBR and DWR, you go to the Porter-Cologne definition of beneficial uses of water of the State where it states that water quality degradation can be included to include domestic, municipal, agricultural, industrial supply, power generation, recreation, aesthetic enjoyment, navigation, preservation, enhancement of fish and wildlife and other aquatic

resources.

Porter-Cologne also defines a quality of water as referring to its chemical, physical, biological, bacteriological, radiological and other properties and characteristics which affect its use. These are the two key definitions that USBR and DWR should have examined when they made their assessment that we only need to look at chloride and EC as an impairment of the potential benefits of constructing the tunnels and the upstream diversions.

Next slide, please.

With respect to the California WaterFix water right change petition and water quality certification process, the State Water Board issued a fact sheet on July 21st, 2016. And this is included in my testimony as CSP [sic] 57, which states that, "In order for the State Water Board to approve a change petition, the petitioner must demonstrate that the change will not initiate a new water right or injure any legal user of water and, 2, provide information on how the fish and wildlife would be affected by the change and identify proposed measures to protect them from unreasonable uses."

As I read the State DWR and Federal USBR assessment of the proposed impacts of the Delta fix --

WaterFix diversions, I find that these assessments do not meet the requirements set forth by the State Water Board in their fact sheet.

Let's go to the next slide please.

In attempt to address some of these issues, representatives of the DWR and USBR made statements at this hearing earlier that some of these issues about other impacts are covered in the BDCP and the revised BDCP draft. I have provided detailed comments on these at the time they were released and find that the information provided in the BDCP and the revised BDCP falls far short of adequately addressing these issues as relates to the impacts of the WaterFix diversions.

Next slide, please.

My experience and expertise in this area comes from 50 years of experience working on water quality evaluation and management focusing on environmental engineering, aquatic chemistry, water quality, public health, and investigating water quality issues in many areas of the U.S. and other Chris.

I have bachelor degree from San Jose State College, master of science in public health from the University of North Carolina, and a Ph.D. from Harvard University which I obtained in 1960.

1960 through 1989, I held university

professorships in environmental engineering and environmental sciences focusing on water quality impact, evaluation, and management.

Recently the American society of Civil Engineers has granted me the position of fellow of ASCE and the local section of ASCE has nominated me as the outstanding senior life member of the Sacramento section.

Next slide, please.

My work on Delta water quality is summarized in CSPA 6. In 1989, while I held a distinguished professorship in civil environmental engineering at the New Jersey Institute of Technology, I was asked to be a consultant at Delta Wetlands Incorporated on water quality issues in the water supply reservoirs that Delta Wetlands proposed to construct in the Central Delta.

I undertook this consulting arrangement based on my experience with -- as a U.S. EPA-appointed U.S. representative to the steering committee for a $50 million, five-year OECD utopication study. This is an -- Organization for Economic Operation and Development is the headquarters in Paris.

This study involved 200 water bodies in 22 countries in western Europe, North America, Japan, and

Australia. It focused on investigating aquatic plant and nutrient load utopication response relationships and models. I was selected by the U.S. EPA to develop the synthesis report for the U.S. part of the OECD study. And eventually I became the U.S. representative at the international steering committee for this study.

That study covered 200 water bodies. Subsequently, Dr. Ann Jones Lee and I have expanded to database to where we now have over 750 water bodies worldwide relating nutrient load uptopication response. So it's with this background -- next slide.

CO-HEARING OFFICER DODUC: Dr. Lee, I noticed your presentation has 39 slides. I would encourage you to skip over the expertise and experience and get to the heart of your testimony, please.

WITNESS LEE: Next slide, please.

The key information which serves as a basis for my assessment of the impact of the WaterFix diversions is presented in CSPA 62, and this is a report that we issued for CALFED in 2003. We've had a whole series of reports since then.

Next slide, please.

The key issue here is the flow of the Sacramento River water into the Delta from the north and the San Joaquin River water from the south. They

mix in the deep water ship channels starting at the Port of Stockton and are carried down the Port of Stockton to the Prisoner's Point location at the center of the slides.

On the slide there is a slide for -- or a note for Turner Cut. Turner Cut is a key point at which the Sacramento River water, which comes from the north, and the San Joaquin River, water which comes up from the south, where the two are mixed and carried into the Central Delta.

Next slide, please.

We found in our studies of the low DO problems on the deep water ship channel that rarely did low DO conditions occur below Turner Cut. So that we had low DO conditions in the deep water ship channel to Turner Cut and no DO conditions below that.

We conducted some surveys of the channels with Delta keeper boats and crew to evaluate these. And these are presented the 65 -- in CSP 65.

Next slide.

Basically we found through these cruises that the deep water in the deep water ship channel is a mixture of Sac -- of Sacramento River water and San Joaquin river.

In order to show this relationship, I have

included a plot from one of many -- oh, sorry -- one of many cruises on the deep water ship channel which starts at Prisoner's 1 -- that's where the Sacramento deep water ship channel water mixes with the Sacramento River water -- and at Station 13 and 14, which is the Port of Stockton.

Turner Cut is just below Station 7. And for relationships here -- earlier in the testimony, there was discussion about the City of Stockton's water supply intake. It's located about Station 4 on the DWR slides, cruises.

Next slide, please.

Examination of the DWR studies -- and this is just one example of many that DWR's produced over the years -- shows that below Turner Cut, which is Station 7, the water has an EC of about 200 micromoles per centimeter. Down or upstream of Station 7 it's a mixture of Sacramento River water and deep water ship channel San Joaquin water. So we have then water -- next slide, please.

At the point of Stockton which has a micromole centimeter of 750 micromoles/centimeter. And there is no SJR water in the deep water ship channel below Station 7. It's all Sacramento River water.

And so what we have then is a mixture of

Sacramento River water and it is high pollutant load down into the Central Delta. The WaterFix diversions will draw at least 45 percent of the exported water from the south. So -- if this condition will continue after the WaterFix diversions are allowed to take place, which means that the Sacramento high pollutant loads will be drawn into the Central Delta.

Next slide.

In order to understand this, we need to examine the State Board's listing of 303 D water bodies that are listed as impaired. Those are water bodies which have concentrations of pollutants above the water quality objective.

Next slide.

I have three tables which basically show the State Board's assessment of this, and this shows that the Sacramento River water has some pollutants in it but at relatively low concentrations.

Next slide.

The Delta water bodies show much higher concentrations and a greater variety of pollutants. And the mixture of the two -- next slide -- is a mixture of impaired water bodies due to pesticides and other factors.

Next slide. We can skip that.

I've discussed that fact that, in making the 303 E list of impaired water bodies, the Central Valley Regional Water Quality Control Board has great difficulties because of the inadequate monitoring that's been occurring on the Delta. And now the Central Valley Board is beginning to address this issue, and we will have much better definition of impaired water bodies in the future once that's finish.

Next slide.

The impact of the WaterFix diversions on Central Delta water quality is shown -- the SJR DWSC -- San Joaquin River Deep Water Ship Channel -- at Turner Cut contains high pollutant concentrations and loads. So they're drawn into the Central Delta primarily by the Turner Cut.

Sacramento River Water, with low pollutant loads and very high quality, is drawn into the Central Delta through Turner Cut and mixes with the San Joaquin River water so, with the proposed WaterFix diversions, will result in reduced concentrations of Sacramento River water, mixing with Sacramento River -- I mean, with San Joaquin River water, and so we'll have an increased impact of pollutants in Turner Cut on water quality beneficial uses of the Central Delta.

Next slide, please.

This same conclusion was developed by the Delta Integrated Science Board when they reviewed the proposed WaterFix RDEIR and EIS.

Next slide.

What's the effects of having increased phosphorous in the Turner Cut? We will have greater algal growth and, with reduced dilution water from the Sacramento River water, the impacts of the algae will be much greater.

The impacts include increased algae and aquatic plants, odors, low DO, so forth. They also include fishing, boating -- these will be covered in Part 2 of this hearing.

Next slide.

A key issue in understanding these issues is the paper by Dr. Erwin Van Nieuwenhuyse in which he discussed how Sacramento water and its phosphorous load impacts the phytoplankton population in the Central Delta. So the two are connected. So as you alter the phosphorous content of Turner Cut due to changes in Sacramento River water entering the Turner Cut, we will see greater impacts on phytoplankton population in the Delta.

Next slide.

These issues have been discussed in a series

of my reports. I won't go into these now.

Next slide.

Originally I planned to cover South Delta that will be covered in Part 2 of this. Basically, I can summarize my findings that what we have here is a situation in which the San Joaquin River water mixes with Sacramento River water and enters Turner Cut, which is then a primary source of water for the Central Delta. This, in turn, will cause a significant degradation of Turner Cut and Central Delta water quality related to the increased pollutants in the deep water ship channel arising from the San Joaquin River.

And I'll stop at that point, and I think it covers the key points that the WaterFix diversions will be significantly detrimental to water quality in the Central Delta. Thank you.

MR. JACKSON: Thank you, Dr. Lee. The next witness is Mr. Jennings. It's probably CSPA 1.

Mr. Jennings, is 1 a true and correct copy of your qualifications?

WITNESS JENNINGS: Yes, it is.

MR. JACKSON: Is CSPA 2 -- excuse me is CSPA 2 Revised a true and correct copy of your testimony for Part 1 of this hearing?

WITNESS JENNINGS: Yes.

(Protestants' Exhibits CSPA 1 and CSPA 2 identified for the record)

MR. JACKSON: Would you summarize your testimony, Mr. Jennings?

WITNESS JENNINGS: Okay. Can everyone hear? Am I loud enough?

Over the last past 30 years, I've spent hundreds of days patrolling Delta waterways and monitoring water quality. I've participated in myriad proceedings regarding the Delta. I've reviewed and commented on thousands of documents, managed hundreds of legal actions, and talked with a multitude -- many multitudes of individuals regarding Delta issues. And my testimony is a composite of that experience coupled with my review of California WaterFix.

CSPA acquired 1412 acres of riparian land in Collinsville in the western Delta near the junction of the Sacramento and San Joaquin rivers. Our property is the site of DWR's Collinsville compliance station. Over the years we've discussed a number of potential projects on how to best utilize our property. But the present degraded water quality adjacent to our land and the prospect of further degradation has delayed any decision.

We patiently waited for the State Water Board

to complete its long delayed update to the Bay-Delta Plan before making a final decision on how to best utilize our property for the best use of our property. The risks and uncertainties of WaterFix, including increased water degradation, have further complicated our decision process.

Project proponents failed to identify the many individual legal user's of water, and the myriad points of diversion in the Delta or specifically analyze potential injury at those diversion points. Instead they suggested compliance with D1641 establishes compliance with the no injury rule.

However, as Victoria Whitney, then chief of the Water Boards's Water Rights Division, informed DWR and USBR in 2004 in a dispute involving Contra Costa Water District, "Significant degradation may occur in the absence of violations of water quality objectives in cases where the degradation impairs a senior water right of a usable quality," unquote.

Excuse me. I've got a frog in my throat. I'm sorry.

Moreover, D1641 implements water quality standards adopted more than two decades ago and only addresses a fractional subset of the numerous harmful pollutants regulated by the State Board under the Clean

Water Act, and regulated pollutants represent a small subset of the universe of potential harmful constituents identified as present in Delta waters. Although the State Board has failed to comply with federal mandates to update Bay-Delta Plan every three years, it has identified numerous pollutants, including various pesticides, metal, metalloids, other organics, pathogens, various nutrients, and unknown toxicity as impairing the beneficial uses of Delta waters on the State Water Board's and U.S. EPA's 303 D list of impaired water -- aquatic segments.

Where pollutants are already identified as exceeding existing water quality criteria, such as electrical conductivity in the Western Delta, water quality is already degraded and users of water are already injured. Any incremental increase in constituent concentration, a reduction in a similar capacity or increase in residence time for pollutants to interact with the environment, even if such an incremental increase would comply with existing D1641 standards, will likely cause further injury to legal users of water.

Since present water quality criteria will inevitably be strengthened over criteria that have proved to be seriously deficient and led to significant

water quality degradation, compliance with D1641 cannot be a standard to demonstrate lack of injury.

Additionally, project proponents have failed to comply with the existing criteria 61 times in the '78-'79 drought, 306 times during the '88 and '93 drought, and they violated Delta -- South Delta criteria almost 1700 times between 1995 and 2015. And during the recent droughts the projects have requested and obtained numerous temporary urgent changes to existing criteria and will continue to rely upon TUPs -- TUCPs under WaterFix.

Standards that cannot be met during drought sequences that have occurred in 41 of the last 100 years cannot serve to establish no injury, especially given continuing climate change.

Water quality and quantity are flip sides of the same coin -- changes in flow, changes in capacity, residence time in the fate and transport of contaminants. Hydrologic changes modify constituent concentration and bioavailability, which in turn can adversely impact beneficial uses and cause injury.

Water from the Sacramento River is of significantly better quality than water flowing into the estuary from the other tributaries, especially the San Joaquin River. Sacramento River water drawn across

the Delta to the export pumps is a major reason water quality in the Delta is better than it otherwise would have been.

Diversion of millions of acre-feet of relatively good quality Sacramento water around the Delta will increase the concentration of existing constituents in the surface waters remaining in Delta. It will also increase the residence time of water in the Delta, thereby enhancing the opportunity for pollutants to interact with the environment. This is exacerbated in a tidal environments where pollutants tend to move back and forth with the tides.

The WaterFix analysis of the likelihood and extent of adverse impacts to Delta water quality is woefully inadequate and technically deficient. Even so, it demonstrates a further degradation in water quality. For example, the testimony of Nader Tehrani states that, for all scenarios exhibit Boundary 2 in the months of July and August, there an increase in EC at Emmanton, about 18 to 19 percent, when compared the NAA.

The BDCP WaterFix RDEIR/SDEIS acknowledges that increases in residence time throughout the Delta and increases -- increased water quality degradation below the North Delta diversion facility for boron,

bromide, chloride, nitrates, dissolved organic carbon, methyl mercury from construction and habitat restoration disturbance, harmful algal blooms, and selenium.

DWR fingerprinting analyses demonstrate that WaterFix will drastically alter the composition of source waters within the Delta, for example, more polluted water from the San Joaquin River rather than relatively good quality Sacramento water will frequently dominate the Central Delta.

The water quality analyses are inadequate and technically deficient. For example, data for the screening analysis that was done to evaluate which constituents will be considered was collected on the upstream Sacramento and the San Joaquin rivers in a west Delta boundary from two old data sets, the Bay-Delta tributaries project and DWR's water data library. DWR apparently no longer maintains the old BDDat [sic] database on its website, at least I searched for it and couldn't find it.

Many of the 182 identified constituents were either not measured or had few -- extremely few data points. The more extensive and current NPDES and USGS data sets were not considered. C-WIC, C-DIN, [phonetic], the SWAMP databases were not utilized.

Interior sites were not considered because modeling assumed no new sources of water quality constituents in the Delta.

In reality, the permitted discharge limits of the seven Delta municipal wastewater treatment plants, which is excluding Sacramento, is more than 100 MGD significantly more water than at times flows in the San Joaquin River at Vernalis.

Additional constituent loading comes from storm water runoff, industrial discharges, irrigation return flows from agriculture, dredging activities, and so forth. Failure to use more robust and available data sets and failure to consider and analyze the extensive mass loading of constituents in the Delta not only renders the screening analysis insufficient, it renders subsequent assessments of water quality technically invalid.

I have identified numerous other flaws in the water quality analysis on Page 1650 of CSPA 19 that I incorporated within my testimony. I will note that I noticed that in the RDEIR/SDEIS they did find some data points for aluminum and improved the analysis.

In a widely quoted comment, statistician E.P. Bach's recommended that -- remarked that all models are wrong, some are useful because models are

complex simulations that, at their best, only represent an idealization of actual field conditions.

Petitioners claim that CalSim II and DSM2 are the best scientific models they have. However, the best models they have should not be confused the best available science. Government agencies, including EPA, NMFS, U.S. Fish and Wildlife Service, Delta STR CHIP Council, the National Research Council have all developed policies and guidelines regarding best available science.

A rigorous independent peer review by disinterested experts is an integral requirement in all definitions of best available science. Another common component of best available science is transparency. California Health and Safety Code Section 57004 requires all Cal EPA organizations to submit for external peer reviews of scientific basis and scientific portions of all proposed policies, plans, and regulations.

A peer reviewer's responsibility is to determine whether the scientific findings, conclusions, and assumptions are based upon sound scientific knowledge, methods, and practices.

The State Board conducted independent peer review of its water modeling for Phase 1 of the

Bay-Delta Plan update. It has scheduled a peer review of the Phase 2 modeling. The scientific basis of any new or interim water quality criteria would need to be peer reviewed.

Unfortunately, the project proponents have not followed the Board's example, and the basic planning and operational models of the State and Federal projects have not received a rigorous and transparent peer review by independent experts. A partial peer review of CalSim was conducted in 2003.

It found that CalSim II had not been calibrated or validated for making absolute values, prediction values, and expressed skepticism that the model was suitable for making comparative analyses. It recommended that a more comprehensive technical analysis of the model be conducted followed by a careful technical peer review, but this was never done.

A 2005 published per review of assigned survey of CalSim users by the Department of Civil Engineering at U.S. Davis was highly critical of the model. Despite numerous versions, modifications, and update of CalSim II over the intervening 13 years, the model has never subsequently been subjected to a comprehensive and transparent peer review by independent experts. It remains largely noncalibrated, unverified, and highly

controversial as evidenced by the extensive modeling testimony presented by experts representing protestants in this proceeding.

Likewise, DSM2 has never been publicly peer reviewed by independent experts, and several of its modules have only received limited validation and calibration. The project's environmental documents described the model as having inherent limitations in simulating hydrodynamic and transport processes in a complex estuarian environment such as the Sacramento-San Joaquin Delta.

It's particle tracking module was severely criticized by the peer review panel of Department of Fish and Wildlife's Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependant upon the Delta.

All DSM2 model runs -- hydrodynamics and water quality -- were based on 16 years of record between 1976 and 1991; however, examination of DWR's water year hydraulic classification indices revealed that the last 16 years of record averaged 9 percent less in unimpaired flow than DSM2 modeled period and 12.9 percent less flow than the CalSim II modeld period, which was 1922 to 2003.

In a period of climate change, a continuing

decline in flow coupled with the constant or increase in pollutant loading inevitably leads to loss of assimilative capacity and increased pollutant concentration.

The Delta Independent Science Board's review of the Draft BDCP EIR/EIS found numerous flaws in the modeling approaches. The failure to compare best case and worse case climate change scenarios, the limited number of constituents modeled, lack of emphasis on validating model oputs with observational data, coupled with the failure to fully incorporate risk and uncertainty the modeling undermines the reliability of results.

Now, the hearing officers objected to the majority of my testimony regarding adaptive management as being outside the scope of Part 1. So I'm going to tread softly here -- and even though I specifically noted that my comments did not address fish and wildlife issues but rather the historic failure to successfully implement the concept of adaptive management in the Delta.

Despite the absence of any adaptive management plan, project proponents envision that adaptive management will guide future managed decisions and actions in the Delta.

The draft adaptive management plan appears to provide for no participation by the general public and legal users of water to evaluate potential injury. In fact, the proposed adaptive management plan virtually ignores water quality and other legal users of water.

I did quote the National Research Council in it's review of BDCP as observing that most adaptive management plans worldwide have failed primarily because of institutional problems that include high cost and lack of resources, unwillingness of decision maker to admit and embrace uncertainties, conflict with institutional and political preferences, and a lack of leadership and implementation.

The 30-year track record of adaptive management in the Delta has been one of failure, and petitioners cannot point to a single complex large-scale adaptive management program that has resulted in significant quantifiable improvement.

The Hearing Officers also objected to my testimony regarding the public trust and beneficial use balance as it relates to injury. So I'll walk softly here as well.

I note that the public trust cannot be separated from conditions regarding injury to legal users of water. Degradation of flow and water quality

can cause injuries to those who divert water directly and those who legally use water for livelihood and subsistence. It extends to those who economically depend upon legal diverters of water and to those whose pocketbooks and property values, health and quality of life are injured by the degradation of water.

Now, by simply assuming -- I'll change. By simply assuming that injury to existing water users is predicated upon whether or not the WaterFix will meet D1641 and the BiOps, petitioners have failed to provide sufficient information necessary to establish that the project will not injure existing water rights users.

The failure to provide sufficient definitive information about the project makes it extremely difficult if not impossible to for the public to evaluate whether or not WaterFix will cause injury. Essentially, they have attempted to transfer their legal burden to prove no injury to the general public without providing the necessary information to enable water users to determine injury.

Now, I listed ten examples, and my testimony, I won't -- for brevity's sake, I won't repeat them here.

I will refer that the Delta Independent Science Board observed in its review of the RDEIR/SDEIS

that the document was sufficiently incomplete and opaque to deter its evaluation and use by decision makers, resource managers, scientists, and the broader public. And in its evaluation, U.S. EPA found that the unusual circumstances of the project mean that information is not yesterday available for a complete evaluation of environmental impacts and, for that reason, a rating of 3 in adequate of the SDEIS is required.

If highly trained analysts and scientists from the Delta Independent Science Board and EPA cannot find enough reliable information on which to base an opinion, the general public populace that may be injured will certainly be unable to render an informed assessment.

Moreover, WaterFix doesn't pass the smell test of common sense. Over mere decades, construction and operation of massive water diversion projects have deprived the estuary of half its flow, turned the natural hydrograph on its head, reduced temporal and spacial variability, depressed complexity and diversity, and decreased dilution flows necessary to assimilate waste.

The Delta cannot be sustained or fixed by diverting additional millions of acre-feet around it.

In closing, petitioners have failed to establish that WaterFix will not injure legal users of water; however, I believe that CSPA will be injured by construction and operation of the project, and while the extent and magnitude of injury are difficult to ascertain, especially concerning the uncertainties related to operations, TUCPs, adaptive management, and the lack of public participation in those processes, the Petition's testimony and environmental documents aren't sufficient to establish that WaterFix will increase water quality degradation and injure a wide range of beneficial users legal users of water.

And I guess I should shut up at that point.

CO-HEARING OFFICER DODUC: Thank you. Mr. Jennings. I was actually hoping that you would make your comment about Aladdin's lamp for the record?

WITNESS JENNINGS: You mean that CalSim is like Aladdin's lamp; it grants wishes to whoever rubs it?

CO-HEARING OFFICER DODUC: All right. Now it's in the record.

MR. JACKSON: I thought that was in his testimony. So is in the record.

CO-HEARING OFFICER DODUC: Now it's officially --

WITNESS JENNINGS: I want to express my appreciation that you read my testimony.

CO-HEARING OFFICER DODUC: You have one witness, I believe, left, Mr. Whitelaw -- Doctor.

MR. JACKSON: I do.

CO-HEARING OFFICER DODUC: And in reading through his testimony and his analysis, I believe he could be quite succinct in his summary.

MR. JACKSON: I think he was more than succinct in his summary.

WITNESS WHITELAW: Yes, except I would like to take a break.

CO-HEARING OFFICER DODUC: Let's take a very short three-minute break, and then Dr. Whitelaw will give his very succinct summary.

(Recess taken)

CO-HEARING OFFICER DODUC: All right. Welcome back everyone. We will now get to Dr. Whitelaw. Let's give him ten minutes to provide his succinct summary.

MR. JACKSON: We will definitely try, but -- the -- first we have a minor change to make after I authenticate his testimony.

CO-HEARING OFFICER DODUC: Okay.

MR. JACKSON: Mr. Whitelaw is CWIN 4 a true and correct copy of your qualifications?

WITNESS WHITELAW: Yes.

MR. JACKSON: Is CWIN 6 a true and correct copy of the report in regard to the change in point of diversion and the no injury rule?

WITNESS WHITELAW: No.

MR. JACKSON: Is there a change you would like to make?

WITNESS WHITELAW: Sure. How do I do it?

CO-HEARING OFFICER DODUC: Read it into the record.

(Protestants' Exhibits CWIN 4 and CWIN 6 identified for the record)

WITNESS WHITELAW: This is the CWIN 6, and it is on Page 8, a paragraph that begins, "Suppose a farmer..." So I'll read it.

"Suppose a farmer is risk neutral, as the petitioners implicitly assume, and suppose further she faces a choice between the status quo with no expected change in salinity and a policy that provides a 50 percent chance that salinity will increase 10 units and a 50 percent chance that salinity will decrease 10 units. Then the risk-neutral farmer is indifferent between the status quo and the policy, as the expected change in salinity under both the policy and the status quo is zero. But if she is risk averse, the prospect

of a 10 unit increase in salinity threatens damage to the farmer greater in magnitude than the benefit from a 10 unit decrease. Losses hurt more than equivalent gains. For the risk-averse farmer, the policy threatens an expected increase in damages, and she will prefer the status quo over the policy. That is the risk-averse farmer would be injured by the policy."

CO-HEARING OFFICER DODUC: So I'm assuming what you just read, you would like to substitute for some current text in this document. So let's identify that current text.

WITNESS WHITELAW: Right there.

CO-HEARING OFFICER DODUC: Right there. So that paragraph, the first paragraph on Page 9 of CWIN 6 should be replaced by what you just read?

WITNESS WHITELAW: Yes.

MR. JACKSON: And we will do that in a clean copy when we file -- we usually have a week afterwards I think is what you've been given before we file the --

CO-HEARING OFFICER DODUC: Since Dr. Whitelaw just read that, I assume he has that in writing?

WITNESS WHITELAW: Yes.

CO-HEARING OFFICER DODUC: So please share copies of that, if you will, during the lunch break with anyone who is doing cross-examination so they have

the correct text should they wish to cross-examine based on that.

MR. JACKSON: We will do that.

CO-HEARING OFFICER DODUC: Now, Dr. Whitelaw, your succinct summary.

WITNESS WHITELAW: So the theme is brevity?

MR. HERRICK: Or humor.

WITNESS WHITELAW: I'll try. Economists.

MR. JACKSON: Would you please summarize your testimony?

WITNESS WHITELAW: Yes.

You had suggested a little background first?

MR. JACKSON: Yes, I would.

WITNESS WHITELAW: Okay. I'm Ed Whitelaw. I did my undergraduate in math, econ, and political science at the University of Montana in Missoula graduating in 1963. Did my doctorate in economics at MIT, dissertation funded by Harvard, and started teaching at the University of Oregon in 1967.

I still teach there. I'm a -- professor emeritus in the Economics Department and in the Honors College. In 1974, I started an economic and consulting financial consulting firm in my basement, and it grew to 50, 60 people and offices in Eugene, Portland, Seattle, and Boise.

In January of this year, I started a small -- very small consulting firm called Fion. And I subcontract -- well, and a couple of research analysts, we subcontract to ECONorthwest, which is the name of the firm I had started back in '74.

And since then, I have engaged in consulting on numerous projects. Most relevant to this matter is I testified -- have testified in large environmental litigation cases, including Exxon Valdez; the Northern Spotted Owl God Squad -- that is the endangered species committees issues; on the BP Deep Horizon spill issues in Louisiana; in New Mexico on cross-pipeline issues involving cultural, economic, social and environmental injuries; in California --

MR. JACKSON: Dr. Whitelaw, I don't mean to interrupt, but I just got a sort of "okay," she's got it.

WITNESS WHITELAW: You can signal me directly if you'd like.

CO-HEARING OFFICER DODUC: All right.

WITNESS WHITELAW: Okay. So let me speak to injury, briefly.

As perhaps most of you know -- and I'll just read from my testimony. A necessary condition for the petitioners to persuade the Board, you folks, that

their proposed change would not injure legal users of water, the condition has become known as the no injury rule. And that applies to, as I understand, each and every legal user of water in the relevant geography.

I'm using "relevant geography" because that is a term of art in many of the pieces of litigation that I have testified on in the past. It applies to environmental litigation; it applies to antitrust litigation; it applies to patent infringement litigation. And I can speak to that first hand because I have testified in all those types of cases as well as personal injury, as in slip-and-fall cases in which the same general logic applies.

And I will describe that now, succinctly. That is, when I approach litigation and my colleagues do, there is a -- or a term of art or a phrase of art called proximate cause. The way I think about it is there is a legal hook on which the court or the hearing board or the attorneys focus. There's a legal hook or a normative standard that defines how things should be.

Then there are any number of experts at the other end. They can be biophysical types in environmental litigation; in antitrust they are probably individuals who are talking about price fixing, on which I have testified; or medical antitrust

involving hospitals and other hospitals, on which I have testified. There are any number of sources of facts, experience, and so on on which -- on which the economist relies to connect the underlying information to the legal hook.

And in that role, and in numerous cases similar this one, I have had to make that link. And to do that is to get these various languages -- that these biophysical scientists or doctors and hospitals and so on -- languages that they don't have in common and get them to a common denominator.

Sometimes it is as simple a common denominator, though not simple to calculate, dollars. So they're dollar denominated. They aren't always dollar denominated, but that's the nature of it. In California, I have done MTBE cases in South Lake Tahoe, in Crescenta, in Orange County, those kinds of things. And it's very similar, although the concentration is more on groundwater, aquifers, than on surface water. But I've done surface water on the Hudson against GE and Williams Connolly.

So given that framework, the no injury rule is a strict one for the petitioners. They are claiming, though, a single measure -- and Dr. Lee and Bill Jennings have already commented on how that seems --

that the D1641 is an inadequate criterion for determining no injury.

And I'll quote or speak to briefly -- okay. So now I'm quoting from CWIN 5, which is what I claimed would be my oral testimony.

Specifically, they, the petitioners, claim their proposal would not significantly change the probability or frequency of exceeding the D1641 Delta water quality standards. But their claim misses the point.

Namely, demonstrating compliance with the D1641 standards is not sufficient to address injury to the other legal users of water. I don't intend this as humor, but it is an anecdote that illustrates my initial perception of what the petitioners were doing.

Thirty years ago, in class, I can remember asking a question of a bright, energetic, eager-to-please student. I asked him the question, and he said -- he'd paused a moment and said, "I don't know the answer to that question, but it reminds me of a question I do know the answer to." That is, what he offered was irrelevant to the notion, in this case, of injury.

Then, the petitioners, they propose to rely on adaptive management. So briefly I'll read my

observations on that and the -- what I propose to be the oral testimony.

Their proposal to rely on adaptive management suffers from four fatal errors, any one of which is sufficient to render their proposal to use adaptive management irrelevant to the matter at hand.

First, their adaptive management plan ignores the other legal users of water -- I've spoken to that already.

Second, the petitioners don't understand uncertainty, neither the concept nor its consequences. And they compound this gap in their knowledge by assuming implicitly and incorrectly risk neutrality among the legal users of water rather than risk aversion.

Third, they ignore the state of the science in developing adaptive management programs. By doing so, they failed to design a program that would be likely to produce successful outcomes given ecological and institutional factors at play in the Bay-Delta.

Fourth, they failed to detail a sufficient long-term funding plan for their adaptive management program.

That's the end of my testimony.

MR. JACKSON: I have one question. You

understand that the Water Code Section 1702 places the burden of proving no injury on the petitioners?

WITNESS WHITELAW: I do understand that.

MR. JACKSON: From your review of all of their testimony, which you did review, correct?

WITNESS WHITELAW: Yes.

MR. JACKSON: Did they carry their burden?

WITNESS WHITELAW: They did not, not even close.

MR. JACKSON: Thank you.

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

With that, we will take our lunch break. And, again, please provide that corrected text for Mr. Whitelaw's testimony to the various parties that are conducting cross examination. And we will reconvene at 1:30.

(Whereupon, the luncheon recess was taken at 12:20 p.m.)

AFTERNOON SESSION

(Whereupon, all parties having been duly noted for the record, the proceedings resumed at 1:31 p.m.)

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CO-HEARING OFFICER DODUC: All right. Good afternoon, everyone. Please take your seats. It is 1:30. We will resume with cross-examination by the Department of Water Resources.

And yesterday, you had anticipated around three and a half hours of cross-examination. Is that still the case?

MR. BERLINER: No, we -- we have, I think, quite successfully honed our cross-examination. I won't say it's going to be brief, but it's going to be half of that estimate, probably.

CO-HEARING OFFICER DODUC: Excellent. Before you begin then, what are the -- what main topic areas that you'll be covering in your much shortened cross-examination?

MR. BERLINER: Should we go witness by witness? Do you want to it do all of them now or --

CO-HEARING OFFICER DODUC: No, just do it as each one comes up.

MR. BERLINER: Okay. Ms. Ansley's going to

start, and then I'm going to pick up Mr. Shutes and Mr. Jennings. And Ms. Ansley will finish with the final witnesses.

CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: Good afternoon. My name is Jolie-Anne Ansley for the Department of Water Resources. And we'd like to begin with Mr. Svjold -- is that how you pronounce your name?

WITNESS SJVOLD: Svjold.

MS. ANSLEY: Svjold. I'll try. And your testimony is CWIN-2; is that correct?

CO-HEARING OFFICER DODUC: And your topic areas?

MS. ANSLEY: Oh, I apologize for that.

Our topic areas, we only have a couple questions, and it's going to be the use and development of the water-year index and then maybe one question on one of the assumptions that he made in his analysis.

CO-HEARING OFFICER DODUC: Thank you.

MS. ANSLEY: Sorry about that.

So Mr. Svjold, do you understand that the water-year index was not developed for the Cal WaterFix specifically?

WITNESS SJVOLD: Oh, I know that, yes.

MS. ANSLEY: Thank you. And so it's also your

understanding that this is an index developed by the board in the Water Quality Control Plan?

WITNESS SJVOLD: I believe that's true, but I have no direct evidence that that is where the source of it is. It's a mystery where it came from.

MS. ANSLEY: Okay. Since it was not developed -- well, will you accept my representation that it was developed for the Water Quality Control Plan at least? Do you know that?

WITNESS SJVOLD: I'll accept that that's probably the case, yeah.

MS. ANSLEY: Do you realize that the water-year index cannot be change, the methodology cannot be changed through this proceeding?

WITNESS SJVOLD: I'm sorry. I don't understand the thrust of the question.

OTHER COUNSEL: So you're claiming in your testimony that the use of the water-year index that you present in your CWIN-3 is that it's scientifically invalid; is that correct?

WITNESS SJVOLD: Yes, yes.

MS. ANSLEY: And do you understand that its methodology, which was developed by the Board, cannot be changed through these petitions for changes in points of diversion?

WITNESS SJVOLD: I didn't know that, no. I was making a scientific finding that I think is important to bring to the Board. It's up to them what they want to do with it.

MS. ANSLEY: Okay. Thank you. And I think just one more question.

So looking at your testimony, which is CWIN-2 maybe we can bring that up. Page 2, please.

And looking at the second paragraph under "Finding," labeled second --

WITNESS SJVOLD: Second paragraph, yes.

MS. ANSLEY: Yes, there we go. Do you see the sentence that you underlined, where you say, "There is no meaning or normal average for the entire record"?

WITNESS SJVOLD: Yes, that is correct.

MS. ANSLEY: And your analysis is based on the assumption that "normal precipitation" means normal or average runoff?

WITNESS SJVOLD: That is the general sense that it's been used in all the observations that I've made, yes.

MS. ANSLEY: So you were not aware that the State Water Project operations actually consider the entire distribution of the forecast rather than the median -- or the mean, as you presume in your analysis?

WITNESS SJVOLD: I'm sorry. Say that again.

MS. ANSLEY: So in using the water-year index and running the formula you have on Page 1 of CWIN-3 --

WITNESS SJVOLD: Yeah.

MS. ANSLEY: -- the normal precipitation is not assumed to be average runoff. Do you understand that?

WITNESS SJVOLD: I'm not even sure what normal precipitation is either.

MS. ANSLEY: Does your analysis assume that it is average runoff?

WITNESS SJVOLD: "Normal," in the general context is usually meant average.

MS. ANSLEY: Okay.

WITNESS SJVOLD: It's not a precise term.

MS. ANSLEY: I apologize for cutting you off.

I have no further questions for Mr. Svjold.

My next questions are for Mr. Custis, and depending on the answers, I may only have just two or three, even.

Good afternoon, Mr. Custis.

WITNESS CUSTIS: Good afternoon.

MS. ANSLEY: Your testimony is Aqua 5; is that correct?

WITNESS CUSTIS: Yes, the written part, yes.

MS. ANSLEY: That's the written part. Would you agree that your testimony is replete with statements that the WaterFix proposes water transfers?

WITNESS CUSTIS: That was my interpretation from reading the documents that they were talking about. I think the first section I go through one, two, three, four, five, six, seven, eight, nine, ten, eleven paragraphs I've taken out of documents which talk about transfers.

MS. ANSLEY: So isn't it true that the proposed WaterFix does not include transfers in any of its alternatives?

WITNESS CUSTIS: I believe -- let's see. What do we have here? The number of citations on the November 2013 Draft EIR/EIS talk about transfers, both the 4,000 acre-feet and the groundwater substitution. Water transfers increase Delta exports from about zero to 500,000 acre-feet in the wettest 80 percent years to potentially more than, in the 20 percent years, up to 1 million acre-feet, which I took that to mean there will be transfers.

MS. ANSLEY: And you get those references from -- just to follow up, you're talking about your testimony that there will be, please correct me if I'm wrong. I think you said 400,000 acre-feet of

groundwater substitution transfers and 507- or so?

WITNESS CUSTIS: 507 I think was the number of thousand acre-feet of crop idling.

MS. ANSLEY: Crop idling transfers? And your source for that was Appendix 5C of the BDCP EIR/EIS?

WITNESS CUSTIS: That was the source. And we also have the Bureau of Reclamation Delta-Mendota 10-year transfers. Those were already in the process.

MS. ANSLEY: Is it your understanding that the San Luis Delta-Mendota ten-year long-term transfer program is part of the California WaterFix?

WITNESS CUSTIS: I would assume that, if the WaterFix is constructed, they would transfer through it, yes.

MS. ANSLEY: So it's not your understanding that those are separate projects?

WITNESS CUSTIS: I think that the ten-year transfer came before the WaterFix hearing that we're having here, so they're, you know, legally separate. But they work together. I can't imagine they'd transfer the water around the tunnels.

MS. ANSLEY: Just as a follow-up question to that, my understanding of the long-term transfer program for the San Luis Delta-Mendota Water Authority is that it's projected to last from 2015 to 2024; is

that correct, approximately?

WITNESS CUSTIS: I think that it's -- it's a ten-year yeah. It's -- it was finalized last year, so yeah, would be. I don't know the exact number, but that's a reasonable ten years.

MS. ANSLEY: Is it your understanding that the California WaterFix wouldn't even be constructed by that point, 2024?

WITNESS CUSTIS: Yes, yes.

MS. ANSLEY: Then just one follow-up question on your assumption that transfers are part of the California WaterFix, you said that your source for that was the Appendix 5C of the 2013 BDCP EIR/EIS, correct? That's where your numbers come from?

WITNESS CUSTIS: There are a number of components to that. There's the Water Supply Chapter 5. There's a Chapter 30. There's a Chapter 7, Chapter 30 again, Chapter 30 again. Chapter 5(c), Chapter 7, 5(c), 5(c), 5(c). So I guess we'd say there was -- the ones I've read there, but yeah, 5(c) comes up several times.

MS. ANSLEY: So you reviewed the petition for the California WaterFix; is that correct?

WITNESS CUSTIS: Say that again.

MS. ANSLEY: Did you review the petition for

the California WaterFix that's this proceeding here today?

WITNESS CUSTIS: I probably -- no, not the one we're looking at today.

MS. ANSLEY: Do any of the chapters you cite, are any of them the project description chapter?

WITNESS CUSTIS: Let's see if there's a project description chapter in here -- cumulative effects, water transfers, supply, water supply and description, affected environment, historical background, Delta watershed groundwater setting.

Go on to water substitution upstream of the Delta. Potential quantities of upstream-of-the-Delta water transfers. That's 5(c).

So I don't know if they are actually chapters titled "Project Description," but to me, things like cumulative effects of water transfers and water supply analysis are part of the project description.

MS. ANSLEY: So looking at Appendix 5(c), is that the source of your numbers for 907,000 acre-feet?

WITNESS CUSTIS: It looks like, yeah. That's the chapter on potential quantities upstream of the Delta water transfers, yeah.

MS. ANSLEY: That's also the source of your testimony regarding a 12 percent correction factor as

well?

WITNESS CUSTIS: Well, that 12 percent is -- was also used by the Bureau of Rec in their 10-year. So, but --

MS. ANSLEY: That would be the ten-year, San Luis Delta-Mendota water long-term transfer program?

WITNESS CUSTIS: That's right.

MS. ANSLEY: Okay.

WITNESS CUSTIS: That 12 percent seems to be the standard default for transfers.

MS. ANSLEY: And I believe this is my last question. So is it your understanding that Appendix 5(c) of the 2013 BDCP EIR/EIS was intended to provide background information on historical cross-Delta water transfer programs and the source regions of such water?

WITNESS CUSTIS: Historical. The title is potential quantities of upstream, so I would think that that's future. There is a discussion in -- there's groundwater setting discussion; there's a chapter in 5(c) has a component that's called "Historical Background of Cross-Delta water transfers and potential source regions Sections 5(c).10.2.

So there's a chapter on historical in there but it also seems to be a chapter on future.

MS. ANSLEY: I think we're right behind Ms. Vlamis. How you pronounce your last name?

WITNESS VLAMIS: You can call me Barbara.

MS. ANSLEY: Thank you. Barbara, I have the similar question to you. Isn't it true that the proposed California WaterFix does not include water transfers as part of any of its proposed alternatives?

WITNESS VLAMIS: I haven't read the alternatives recently, but I have the same impression as Mr. Custis does, that it is discussed quite clearly in the documents that have been used for this project.

So it's very unclear what the source waters are. So when someone like me sees something about a transfer, you pay attention to it because it certainly looks like that could be a source because we've been struggling to try to find the source in all of the agency's documents.

MS. ANSLEY: I understand.

Okay. I'm going to pass it over to Mr. Berliner, who will pick up with Mr. Shutes and Mr. Jennings.

CO-HEARING OFFICER DODUC: Mr. Berliner, since I assume your cross-examination will be more extensive, perhaps you would give us the topic areas you'll be covering.

MR. BERLINER: Yes, I will. I'll start with Mr. Shutes and a little bit, briefly, on Mr. Shutes' background; CVP and State Water Project reservoir operations; his opinions about modeling, overall -- his opinions about modeling, overall project operations, and future TUCPs.

CO-HEARING OFFICER DODUC: Okay.

CROSS-EXAMINATION BY MR. BERLINER

MR. BERLINER: Mr. Shutes, we're sort of sitting a little awkwardly. Would you be more comfortable moving back? Or you don't have to look at me if you don't want; that's fine because you need to answer towards the Board anyway.

WITNESS SHUTES: That's fine. I moved up here because there wasn't a computer screen in the previous spot; so I think I'll stay here. Thank you.

MR. BERLINER: Okay. Wherever you're comfortable is fine.

Mr. Shutes, you're not an engineer, correct?

WITNESS SHUTES: That's correct.

MR. BERLINER: And you've never held a position operating a water system, correct?

WITNESS SHUTES: That's correct.

MR. BERLINER: An your testimony mentions that you have gained some familiarity with water balance

models, correct.

WITNESS SHUTES: It mentions that.

MR. BERLINER: Do you have any prior experience running or working with CalSim or DSM2?

WITNESS SHUTES: No.

MR. BERLINER: Have you ever received any training regarding those models?

WITNESS SHUTES: I have sat in workshops with modelers discussing some of the inputs and problems with those -- with CalSim in particular. But I have not received training in the operation of the model.

MR. BERLINER: All right. Let's talk a little bit about your opinions about reservoir operations.

Now, just to be clear, in light of our just questions and answers here, you haven't done any modeling and CalSPA has not done any modeling of the reservoir operations, correct?

WITNESS SHUTES: Of what reservoir operations?

MR. BERLINER: State and federal water project.

WITNESS SHUTES: That's correct.

MR. BERLINER: And you've not done any -- by "you" I mean you or CalSPA. You've not done any modeling of system operations under the California WaterFix for the reservoirs, have you?

WITNESS SHUTES: No.

MR. BERLINER: And you made a statement about the fact that -- or your contention that there's no carry-over storage requirements for any of the major reservoirs. And among those, you listed Shasta, correct?

WITNESS SHUTES: That's correct.

MR. BERLINER: Are you aware of the carryover requirements that are in the biological opinions?

WITNESS SHUTES: I am. I'm also aware that there are exceptions to those carryover storage requirements and that there are provisions for what happens if there are shortages under the proscribed carryover storage requirements.

They're not firm numbers. And that was what I was referring to in my testimony. Rather, they are -- in this case, I would categorize it more as a target that's supposed to be met a certain number of years out of a given number of years; it's not a requirement.

And there is a provision within the biological opinion to address what happens if they're not able to meet the target.

MR. BERLINER: Well, what you're not calling a target, you don't consider that Reclamation has to meet those numbers 80 percent of the time and that, if they

don't meet those numbers, there's certain other steps they have to take? You don't equate that to a minimum reservoir requirement?

WITNESS SJVOLD: I think it depends on what you mean by requirement.

MR. BERLINER: Are the biological opinions legally binding on Reclamation?

WITNESS SHUTES: They are.

MR. BERLINER: And they're also binding on the Department of Water Resources?

WITNESS SHUTES: They are.

MR. BERLINER: So are you suggesting that the directives that are in the biological opinions are not legal requirements?

WITNESS SHUTES: I'm suggesting that the carryover storage provisions in the biological opinion for Shasta Reservoir contain provisions for what happens if they don't meet those requirements, and I'm aware of occasions on which they have not met those requirements.

And under those circumstances, they've -- in this case, the Bureau has taken different steps, among which, in the recent drought, was to ask for a temporary urgency change petition.

MR. BERLINER: And while there are no mandated

carryover targets for Oroville, you have an understanding of the operation of Oroville, correct?

WITNESS SHUTES: I do.

MR. BERLINER: In fact, you participated in the FERC re-licensing for Oroville, correct?

WITNESS SHUTES: I did not participate in the FERC re-licensing per se. I participated because that was before my time at CSPA. At that time, I was a volunteer, and I was working on only two hydro re-licensings. I did participate in the proceeding for the water quality certification for Oroville.

MR. BERLINER: Which was part of the FERC requirements, correct?

WITNESS SHUTES: It is a separate requirement that must be incorporated by law into the FERC license.

MR. BERLINER: So are you aware that there are -- that DWR has targets that it has established for itself for Oroville carryover storage?

WITNESS SHUTES: I'm aware that there are general operations that I have observed about where they tried to get to. They are not firm targets.

And one of the issues of contention in my participation in the -- two of the issues in my participation in the water quality certification for Oroville were, first, that there was not a firm target

and, second, that there were provisions in the settlement for Oroville which in my opinion would have allowed reduced carryover storage compared to the then-existing condition by means of facilities adjustments that are contemplated in the settlement.

MR. BERLINER: Let's move on. We're getting a little far astray here on that.

Referring to your testimony you provided an opinion that the petitioners haven't defined or quantified the current operations of the project reservoirs, correct?

WITNESS SHUTES: That's correct.

MR. BERLINER: And that the petitioners haven't defined the future operations of the California WaterFix once it's constructed and operating?

WITNESS SHUTES: What I think I said was that they haven't defined reservoir operations in the context of the construction of California WaterFix.

MR. BERLINER: And do you understand that, when they operate the -- either currently or under the California WaterFix, they're going to be constrained in their operations by a number of regulatory requirements, including things like the biological opinions and D1641 as it currently stands or may be amended in the future?

WITNESS SHUTES: Yes.

MR. BERLINER: And are you aware that upstream regulatory requirements have been set forth in the EIR/EIS for this project and also in the biological assessment?

WITNESS SHUTES: Could you tell me what you mean, please, by "upstream regulatory requirements"? Upstream of what?

MR. BERLINER: For the reservoir.

WITNESS SHUTES: Reservoir operation requirements?

MR. BERLINER: Yes, yes.

WITNESS SHUTES: Would you repeat the question, please?

MR. BERLINER: Sure. Are you aware that the regulatory requirements for the upstream reservoirs have been set forth in the EIR/EIS and in the project assessment?

WITNESS SHUTES: I don't know what you mean by "regulatory requirements." I think we're having a definitional issue again. But my understanding of the way reservoirs would be constrained under your proposed project would be that you would attempt to meet the regulatory constraints that don't deal directly with reservoir storage, but rather which deal with other

factors, including the ability to meet future downstream needs in the Delta under D1641 and potentially water temperature requirements in the respective rivers, that sort of thing.

If by "requirements" you mean do you set out and define what the requirements for reservoir operations are going to be, I do not believe those are in either document, although I haven't reviewed the biological assessment as carefully. And I don't believe that the --

MR. BERLINER: That's fine.

WITNESS SHUTES: Okay.

MR. BERLINER: You contended that, during the last drought, legal users of water were harmed. What water users are you referring to?

WITNESS SHUTES: I would say there would be two sets of water users that were harmed. I would say water users -- for example, CVP contractors north of Delta. And also water users in the Delta were harmed both by -- principally by water quality degradation.

MR. BERLINER: With regard to the in-Delta users, are you contending that there's -- that there are users in the Delta that diverted less than their full water right or full water entitlement?

WITNESS SHUTES: Well, without getting into a

discussion of what that entitlement might be --

MR. BERLINER: I'm only asking you if you're contending. I'm not asking for a quantification.

WITNESS SHUTES: The -- a number of Delta water users voluntarily reduced their Delta usage, their in-Delta usage by 25 percent, and I believe it was 2015, in 2015. So that's a quantitative thing.

I'm also aware, and I reviewed this, that water quality standards were changed and salinity numbers were considerably higher than the numbers given in D1641 in 2015.

MR. BERLINER: So you -- you earlier raised the question of TUCPs. Do you understand that, for a temporary urgency change, the Water Board has to make a determination that there wouldn't be injury to legal users of water?

MR. BERLINER: I do, but in my testimony, I point out that that definition of injury is only applicable in the immediate. And so when, in 2014 and 2015, Mr. Howard made determinations that there would be no legal [sic] injuries to users of water, that didn't look backward at how the reservoirs had been operated prior to that. It only looked at what would happen going forward.

And part of our contention here and my

contention is that it's the long-term operation and not simply what happens in an emergency that determines whether or not there's injury. CSPA raised that issue in our protest and elsewhere, by the way.

MR. BERLINER: Understood.

In your testimony, you discussed some of the modeling results for the no action alternative in comparison to existing conditions --

WITNESS SHUTES: Correct.

MR. BERLINER: -- for carryover storage at the end of September, correct?

WITNESS SHUTES: Correct.

MR. BERLINER: And you noted that there was an 878,000 acre-foot difference, correct?

WITNESS SHUTES: Correct.

MR. BERLINER: Did you hear the testimony or read the testimony of Mr. Armin Munevar?

WITNESS SHUTES: I did.

MR. BERLINER: Do you recall how he explained that the CalSim modeling was intended to be used for comparative purposes only?

WITNESS SHUTES: Yes. And I was comparing the no action alternative with the existing conditions.

MR. BERLINER: So do you understand that this doesn't mean that the modeling -- that the modeling

results are not intended to predict the actual end of September storage?

WITNESS SHUTES: I understand it's for comparative purposes.

MR. BERLINER: So you understand that it is not meant to be an actual prediction of end of September storage; it is meant solely as comparative?

WITNESS SHUTES: It's not meant to be an absolute prediction.

MR. BERLINER: This is for the court reporter.

Did you get that exchange okay?

THE REPORTER: I got "...end of September," and then --

MR. BERLINER: "Storage."

THE REPORTER: Thank you.

WITNESS SHUTES: I apologize.

MR. BERLINER: Now, you've characterized your -- if I understood correctly, you've characterized your testimony as being qualitative rather than quantitative, correct?

WITNESS SHUTES: You'd have refer me to which part of the testimony you're referring to.

MR. BERLINER: Well, you had a sort of general characterization that you are offering some qualitative testimony. And I didn't want to mischaracterize what

you were offering. But I didn't find any specific quantitative analysis in your testimony.

WITNESS SHUTES: Well, for example, I did quantify the difference between what you're -- what is the -- one of your environmental documents, it's in CSPA 36, predicts comparatively between the no action alternative and the existing conditions. That's quantitative. I'm not really sure what you're asking.

MR. BERLINER: All right. Well, let me ask you this in a little bit different way.

You've made a contention in your testimony that once the WaterFix is in place, that -- and I'm using my own words here, but trying to just get the gist of your comment -- that the contractors would lobby to have the standards relaxed.

Is that your general contention?

WITNESS SHUTES: I think they're doing that at the present time and that they'll continue to do that.

MR. BERLINER: So -- and you're suggesting that that will occur once WaterFix is in place, correct?

WITNESS SHUTES: Yes, I think there will be more pressure to export more water because it will not be as constrained by in-Delta conditions and other factors.

MR. BERLINER: And you're not referring just to TUCPs, correct? You're referring to overall operations of the project?

WITNESS SHUTES: Correct.

MR. BERLINER: So are you suggesting that there won't be biological opinions that are binding or Board orders that won't be binding on the operations of the projects? In other words, there would have to be regulatory changes to allow the projects to be operated differently?

WITNESS SHUTES: There would have to be regulatory changes, and I think those could come from another place. So I think what I'm talking about is not that the contractors would -- in this case, would ask that the projects violate the law. They would ask that somebody change the law, whether it was the State Board, Congress, or other officials or the, for example, the U.S. Fish and Wildlife Service or National Marine Fisheries Service who, as we speak, are initiating new consultation for the projects as they're currently operating.

MR. BERLINER: Are you aware of the testimony that Mr. Jennings has submitted in the proceeding?

WITNESS SHUTES: I am.

MR. BERLINER: Have you read it?

WITNESS SHUTES: I have.

MR. BERLINER: Do you disagree with Mr. Jennings when he -- and I'm paraphrasing -- contends that, under the California WaterFix, requirements are likely to be more stringent than they currently are?

WITNESS SHUTES: I believe he said that.

MR. BERLINER: Do you disagree with him?

MR. JACKSON: I'm going to object. That's not what Mr. Jennings testified to. And unless he can -- unless he has a source for that, I think this is -- I think he's just mischaracterizing Mr. Jennings.

CO-HEARING OFFICER DODUC: Yes, I actually was looking at Mr. Jennings when Mr. Berliner made that statement. Mr. Jennings?

MR. BERLINER: I will provide it if -- I'd be happy to provide it.

CO-HEARING OFFICER DODUC: Actually, why don't you do that, please.

MR. JACKSON: But if he does, to keep the family healthy, I would prefer that he not answer that question.

CO-HEARING OFFICER DODUC: Well, actually, he did already. But we'll pretend we didn't hear it.

WITNESS JENNINGS: I would just observe that I

think that, then the Board conducts its update of the Water Quality Control Plan, given what's happened in this estuary, both water quality-wise and fishery-wise, the standards are going to be more stringent.

Regard- -- just given the fact that, under the present standards, the estuary has collapsed and is in fact continuing to collapse. So I think that assuming -- I'll shut up. Okay.

On advice of counsel, I'll shut up.

CO-HEARING OFFICER DODUC: At least your counsel allowed Mr. Ansley to call one of his witnesses by her first name.

MR. JACKSON: I never get into things like that.

MR. BERLINER: Rather than taking up a lot of time, I will find it and get back get back to it.

CO-HEARING OFFICER DODUC: The point, I guess, of your questioning is?

MR. BERLINER: Point of my questioning was that Mr. Shutes' colleague has -- and has just said again that the future requirements are likely to be more stringent rather than less stringent. And Mr. Shutes has suggested that the contractors are going to be able to relax the standards.

WITNESS SHUTES: I didn't suggest that they be

able to it.

MR. BERLINER: I was just asking if he disagrees.

WITNESS SHUTES: I suggested that they would try. That's different.

CO-HEARING OFFICER DODUC: All right.

MR. BERLINER: Okay. That's fine.

WITNESS SHUTES: And there's also something else with that, and that is --

MR. BERLINER: There's no question,

CO-HEARING OFFICER DODUC: Mr. Shutes, your attorney is coming to gag you.

MR. JACKSON: Stop it.

I am sorry. I've got a do some circling.

The actual objection to that was there's no question from the...

MR. BERLINER: So continue, Mr. Shutes. You also contended in your testimony that the projects will be under pressure to export more stored water with the California WaterFix in place, particularly in wetter years, correct?

WITNESS SHUTES: Correct.

MR. BERLINER: Okay. So in a hydrologically wet year, isn't it true that there is often surplus water reaching the Delta?

WITNESS SHUTES: Depends on how you define "surplus."

MR. BERLINER: Well, in the EIR/EIS it defines "surplus" as water that's not needed to meet senior water requirements or regulatory requirements.

WITNESS SHUTES: With that definition, there tends to be what you call surplus water in the Delta.

MR. BERLINER: And you're also aware that surplus water can also originate below the project reservoirs, correct?

WITNESS SHUTES: Correct.

MR. BERLINER: And you're also aware that there is oftentimes in wet years flight control releases or spills from reservoirs that would comprise surplus water, correct?

WITNESS GRANT: Again, what you call surplus water, yes.

MR. BERLINER: And you're not contending that that surplus water is not available for export, are you?

WITNESS SJVOLD: We're not talking about what the environmental impacts of diverting unregulated water, which is what I would call it, are in the proceeding. But my testimony goes to stored water, not to unregulated water.

MR. BERLINER: And are you suggesting that the project should not be allowed to release and recapture stored water?

WITNESS SHUTES: I'm suggesting that if the -- short answer to that is no.

MR. BERLINER: So you're not contending that they should be -- let me just make sure we got this right.

You're not contending that they should be prohibited from releasing stored water.

WITNESS SHUTES: Not in all cases, no.

WITNESS SJVOLD: May I interrupt here for a minute?

MR. JACKSON: No.

MR. BERLINER: No, you can't. Sorry.

Have you been following what's been going on during the recent drought regarding requirements on upstream reservoirs for cold water pool?

WITNESS SHUTES: Yes.

MR. BERLINER: Would you expect cold water pool standards to be relaxed -- cold water pool requirements to be relaxed or increased in the future?

WITNESS SHUTES: Depends on the circumstances.

MR. BERLINER: Well, based on the fishery situation as we know it today?

MR. JACKSON: That's a Part 2 question, fishery situation.

MR. BERLINER: No, it's a reservoir operations question.

CO-HEARING OFFICER DODUC: Mr. Shutes, are you able to answer?

WITNESS SHUTES: Yes. But I think you need to provide more specificity. Are you talking about regulatory requirements? Are you talking about within any given year? In times of shortage? What are you talking about?

MR. BERLINER: Are you aware that, during the current drought and currently, that there are -- that the reservoir operators have been required to provide temperature plans?

WITNESS SHUTES: Yes.

MR. BERLINER: Would you expect that that requirement for temperature plans is going to continue into the future?

WITNESS SHUTES: I think it would depend on the water year probably. I honestly don't know what the Board or other regulatory agencies are going to do, whether they're going to limit that kind of activity to relatively dry years or whether they're going to include wetter or very wet water years within that.

MR. BERLINER: Now, I understand you're offering your opinion about the actions that the contractors might take in the future regarding requesting relaxation of the standards. Are you suggesting that -- or strike that.

Do you have any evidence that DWR and Reclamation are planning to change their risk tolerance going forward in the future?

WITNESS SHUTES: I don't know what their risk tolerance is other than what they've done in the last several years. Part of the evidence was evidence I cited in the comparison of the no action alternative and the existing conditions alternative or the existing conditions as it was modeled.

800,000 acre-feet, whether it's an exact number or not, north-of-Delta reduced storage by the year 2025 suggests to me that they're going to increase their risk tolerance.

And otherwise, I don't know exactly -- and we don't have a description of exactly how decisions are made in terms of how much water is allocated and delivered in any given year and how much is kept in carryover storage. That's a lot of what my testimony goes to.

MR. BERLINER: The project operators could do

what you've suggested as of today, correct?

WITNESS SHUTES: It would be easier to do it under California WaterFix because there will be more opportunities to export the water and less constraints on Delta export operations.

MR. BERLINER: I have no further questions for this witness.

I'd like to cross-examine Mr. Jennings, if I might.

CO-HEARING OFFICER DODUC: It's a good thing Mr. Jackson is sitting right next to Mr. Jennings.

MR. JACKSON: I don't know how I picked this place.

MR. BERLINER: Questions for Mr. Jennings will include water quality data collection, water quality on the Sacramento River, questions about the property that CalSPA has and any harm to that property or its water rights and then questions about modeling.

Mr. Jennings, did I understand that you conduct water quality sampling in the Delta?

WITNESS JENNINGS: Well, we certainly did when I was the Delta keeper. CSPA has not.

MR. BERLINER: And you mentioned in your testimony here today that you contended that DWR had not looked at a number of databases for water quality

information and data regarding various water quality constituents, correct?

WITNESS JENNINGS: Yes.

MR. BERLINER: And you ticked off a number of source where there might be that type of information available, correct?

WITNESS JENNINGS: Yes.

MR. BERLINER: You recall that?

WITNESS JENNINGS: Yes.

MR. BERLINER: What evidence do you have that DWR didn't consult those sources?

WITNESS JENNINGS: Well, I'm looking at the DWR's screen analysis. It mentions that it used the old BDat database and then the DWR water library. And I searched the water library, and it's -- and the monitoring points that would seem to be reflective to where they collected the source water analysis didn't match up with a lot of the NBDS monitoring data.

There's a vast array of ambient monitoring data conducted under the NBDS program, as well as other programs, the irrigated lands program. And the State Board maintains a database, extensive databases -- C-WIC, C-WIN, SWAMP -- that has an enormous amount of data. And looking at the data points, I mean, how many data points -- how many times a given constituent was

measured as well as detects in the summary sheets, a lot of constituents had zero measurements, 1, 2, 6, 12 for the -- some of the more common constituents like, you know, salt or whatnot; they'd be in the hundreds. But it was clear that they hadn't looked at the vast universe of a priority of pollutants even. And even their interior station like Buckley Cove, on copper, there were very few data points.

MR. BERLINER: We know that water quality data for the Delta can be sometimes very difficult to acquire. So just -- I expect you agree with that statement?

WITNESS JENNINGS: Well, I mean, there's certainly a push to develop a regional monitoring program for the Delta much as in the Bay, and that's to be, you know, applauded. But there's a lot of actual ambient information and discharge information out there that would provide far more information, knowledge than one can find in the WaterFix documents.

MR. BERLINER: You made -- you offered a contention that Sacramento River has better water quality than the San Joaquin River, correct?

WITNESS JENNINGS: Right. I think that even the project proponents admit that.

MR. BERLINER: Now, you're not suggesting that

for every constituent, are you?

WITNESS JENNINGS: No. Generally speaking, though, that the watershed -- water coming down the Sacramento is much larger volume and much more in most of the concen- -- the constituent concentrations than come down the San Joaquin.

MR. BERLINER: So for instance, you're aware that the Sacramento is higher in ammonia than the San Joaquin?

WITNESS JENNINGS: From -- the wastewater from the Sac Regional? Yes.

MR. BERLINER: That would be the primary source.

If we could get 606, please. Are you familiar with the Delta mercury TMDL?

MR. OCHENDUSZKO: Mr. Berliner, is this DWR 606?

MR. BERLINER: Yes, it's the one that's on the -- yes.

Mr. Jennings, are you familiar with the -- that there's a TMDL for mercury in --

WITNESS JENNINGS: Yes.

MR. BERLINER: And isn't the higher source of mercury the Sacramento River as compared to the San Joaquin?

WITNESS JENNINGS: Well, certainly there are some mercury sources in the San Joaquin, but I think that that clearly -- at least it's what current monitoring has found, that most of the sources are north of the Delta.

MR. BERLINER: In fact, are you familiar with this report from the Aquatic Science Center, "Summary of Current Water Monitoring Programs in the Delta"?

WITNESS JENNINGS: I've seen it but not for a long time.

MR. BERLINER: Just if you scroll to the next page. You'll see that it indicates that the -- that the San Joaquin River contributes substantially less of the mercury than the Sacramento River. So just as a -- strike that.

With regard to project operations, State and Federal project operations, the constituents of concern that you've identified, those are not a result of project operations, correct?

WITNESS JENNINGS: Pardon?

MR. BERLINER: The constituents of concern that you've identified in your testimony, those constituents are not a result of the operation of the State and Federal water projects, correct? They're byproducts of other uses?

WITNESS JENNINGS: I would tend to agree. The concentration of those constituents, I think, are attributable to the water projects.

MR. BERLINER: Is part of your contention that the WaterFix is going to change water quality in the Delta because the projects would be moving less Sacramento River water across the Delta?

WITNESS JENNINGS: Yes.

MR. BERLINER: And you're concerned that the change in source water will impact water quality, correct?

WITNESS JENNINGS: That's -- that's been my testimony and the testimony of many others. And I think that's even acknowledged by proponents.

MR. BERLINER: Are you suggesting that there's going to be a -- that this change in source water is going to be a problem for the CalSPA property at Collinsville?

WITNESS JENNINGS: Well, I know that even the DWR has acknowledged that EC will rise up to 19 percent at Emmaton, which is just upstream of Collinsville. So I would think that there's certainly the possibility, perhaps the likelihood, that -- that the elimination of the freshwater -- certainly below the diversion points, the elimination of fresh Sacramento water will increase

salinity in that area.

MR. BERLINER: Have you had a chance to take a look at the supplemental modeling that was done in the recirculated EIR/EIS?

WITNESS JENNINGS: Could you rephrase that question?

MR. BERLINER: Have you reviewed the supplemental EIR/EIS?

WITNESS JENNINGS: I looked at it, yes.

MR. BERLINER: Did you look at the modeling that was done for water quality for the Sacramento River at Mallard Island?

WITNESS JENNINGS: I may have. As I'm sitting here, I can't recall.

MR. BERLINER: Do you recall whether you reviewed the modeling for the San Joaquin River at Antioch?

WITNESS JENNINGS: Recall when I did?

MR. BERLINER: No, if you did.

WITNESS JENNINGS: I -- I -- I presume I looked at it, but I can't recall right now.

MR. BERLINER: If I reminded you that there was modeling done and that it indicated that there was no change in source water quality at either Mallard Island or Antioch, does that fresh your memory at all?

WITNESS JENNINGS: I would accept that your modeling perhaps showed that there would be no change.

I know that DWR's source water -- I mean, fingerprint analyses showed that most areas in the Delta would experience significant changes, certainly in the Central Delta. It was less so, I think, in the Western Delta.

MR. BERLINER: Regarding the property that CalSPA owns, you -- I think you indicated that there is a lease with DWR for water quality monitoring on that property. But is there any other current use of that property?

WITNESS JENNINGS: No. We've -- we've looked at a number of -- of discussions. I mean, we've talked about as a mitigation bank, as a community garden food bank. As a -- as a -- center for environment groups to gather, as something for children. I mean, we've looked at a wide number of things.

And almost all of those things that we've looked at depend upon the quality and the viability of the water surrounding it. I mean, we certainly -- we have property on the water side of the levee, and that's -- that's habitat and certainly will be affected by any changes in water quality.

MR. BERLINER: So there's no water use going

on in that property at this time?

WITNESS JENNINGS: We're not diverting, no.

MR. BERLINER: And you made a contention that the water quality standards at your property had degraded. What evidence do you have of that?

WITNESS JENNINGS: I'm sorry. What?

MR. BERLINER: You made a statement in your testimony that water quality adjacent to your property has been degraded. What evidence do you have of that?

WITNESS JENNINGS: I think the historical record of salinity intrusion. I mean, that CCWD and Antioch and others have shown that that -- with the diversion of up to half of historic unimpaired flow into the estuary, that salt intrusion has progressed west -- eastward.

MR. BERLINER: So you're not citing any evidence in your testimony? There was no discussion of that in your testimony. Are you relying on work done by others for that statement?

WITNESS JENNINGS: Well, it's certainly a -- relying upon work done by others and my common sense of -- that the significant diversion of upstream fresh waters will inevitably lease to eastward movement of salt.

MR. BERLINER: Now, we're here dealing with a

very significant project of California WaterFix. We're not dealing with Delta problems in general or other upstream actions as they may affect water quality.

But with regard to the California WaterFix, and I'm only focusing on what's in front of the Board, isn't it true that the assimilative capacity is not going to change at Collinsville under WaterFix?

WITNESS JENNINGS: I'm not persuaded of that because essentially the elimination of several 2 1/2 million acre-feet of relatively fresh water flowing down the Sacramento that traditionally has come into the Delta and helped create a -- a salt barrier, I mean, you know, some of that water, as it's drawn to the south, keeps current South Delta pumps -- comes in, flows down almost to our property and then turns and is drawn to the pumps. And so, you know, I'd have to -- to look carefully at the numbers and make -- I'd have to think further on whether, in fact, there is actual harm there. I'm persuaded there is generally because of the presence of additional freshwater there.

MR. BERLINER: If you could pull up Exhibit 607, please?

MR. HUNTER: This is DWR 607.

CO-HEARING OFFICER DODUC: And Mr. Berliner, another half an hour?

MR. BERLINER: Probably a little bit less, but if you put 30 minutes up, I shall finish within that. Just for me.

CO-HEARING OFFICER DODUC: Is the court reporter okay with us taking a break then?

THE REPORTER: Yes.

CO-HEARING OFFICER DODUC: Yes, okay.

MR. BERLINER: And just to be clear, that's my finish with Mr. Jennings, right?

So just briefly, in case this --

CO-HEARING OFFICER DODUC: I'm sorry. Just to be clear, you have other questions beyond --

MR. BERLINER: We have other witnesses to do.

CO-HEARING OFFICER DODUC: Ah. So in total, you'll need how much for your complete cross-examination?

MR. BERLINER: 45, 50 minute minutes total.

CO-HEARING OFFICER DODUC: Okay. So actually --

MR. BERLINER: And we can take a break any time you want.

CO-HEARING OFFICER DODUC: Then we should take a break for the court reporter.

MR. BERLINER: Absolutely.

CO-HEARING OFFICER DODUC: All right. Let's

take a break, and we will continue at 2:45.

Actually, before we do, actually, let me ask are there any witnesses for whom you do not have cross-examination? I'm talking to DWR right now. Yes. I'm wondering if I can dismiss some of them.

MR. BERLINER: Well, we don't have any questions for Mr. Brobeck. And, of course, there's some witnesses we've already crossed, so we don't have any additional questions for them.

CO-HEARING OFFICER DODUC: I'm sorry. The only witness whom you do not have questions for would be Mr. Brobeck.

MR. BERLINER: That's correct.

CO-HEARING OFFICER DODUC: Does anyone have questions for Mr. Brobeck for cross-examination?

MR. WALTER: Hanspeter Walter. I have one question. We could do it now and release him.

MR. BERLINER: That would be fine.

CO-HEARING OFFICER DODUC: And then Mr. Jackson might have redirect, right?

MR. JACKSON: Yeah. But I don't -- I mean, if there's only one question, then I'm not likely to redirect. I guess what I would wonder is if, since Mr. Brobeck and Ms. Vlamis are driving together, if there's questions for her.

CO-HEARING OFFICER DODUC: Are there any questions for her?

MR. WALTER: Actually, have I have the same question for both of them, so one question each.

CO-HEARING OFFICER DODUC: Okay.

MR. WALTER: Hopefully. That's optimistic. It's a yes-no question. At least in my mind it is.

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

Anyone else have questions just for Mr. Brobeck and Barbara?

(No response)

CO-HEARING OFFICER DODUC: All right. So after our break, if you don't mind us interrupt interrupting you Mr. Berliner and Ms. Ansley, we'll allow Mr. Walter to ask his two questions of these two witnesses. And we'll allow Mr. Jackson to conduct any redirect if he so wishes, and then they may be dismissed. All right?

So we will, again, take our break. And we'll come back at 2:50 now.

(Recess taken)

CO-HEARING OFFICER DODUC: Okay, people. Here's a plan based on the estimates that I was given yesterday for cross-examination.

I think we're going to try to power through today and get these witnesses done, which means we may stay later than 5:00.

But what I would also like to do, as we're starting to do, is identify witnesses that have the least amount of cross-examination so that way we can dismiss them earlier if possible.

Mr. Berliner.

MR. BERLINER: I think I can be helpful. We have short-circuited quite a bit of the cross-examination for Mr. Jennings, so I'll only be just a few more minutes with him.

CO-HEARING OFFICER DODUC: Okay. And then you still have questions for --

MR. BERLINER: Mr. Cannon, Mr. Lee -- Dr. Lee.

CO-HEARING OFFICER DODUC: All right. Let me ask the other parties who wish to conduct cross-examination to come up and identify whom it is that you wish to cross-exam.

MR. WALTER: Ms. Doduc, Hanspeter Walter, San Luis Delta-Mendota. I have probably 10 minutes for Mr. Jennings at the most, and that's the only other --

CO-HEARING OFFICER DODUC: I have a feeling Mr. Jennings may be staying for a while.

Ms. Sheehan?

MR. SHEEHAN: Becky Sheehan. We are also working our efficiencies, and we will not have any cross-examination.

CO-HEARING OFFICER DODUC: Awesome.

Mr. Herrick?

MR. HERRICK: Well, since I can't go visit my granddaughter at a parade this evening because I thought I was going to go on tomorrow, I can go without cross-examining Mr. Brobeck and Ms. Vlamis, but I do have questions for the others.

CO-HEARING OFFICER DODUC: Okay.

MR. HERRICK: But it won't be more than a half an hour, like I said.

CO-HEARING OFFICER DODUC: All right. But you don't have questions for Mr. Jennings at all?

MR. HERRICK: I do. The only two I won't, because you were trying to let them go early, was Mr. Brobeck and Ms. Vlamis.

CO-HEARING OFFICER DODUC: Well, I was trying to see who else I can dismiss early.

MR. HERRICK: Not Mr. Jennings.

MR. KEELING: We all wanted him here for months. We have him. Use him.

CO-HEARING OFFICER DODUC: All right. In that case, why don't we go ahead and turn to Mr. Walter for

his cross-examination of Mr. Brobeck and Ms. Vlamis.

CROSS-EXAMINATION BY MR. WALTER

MR. WALTER: I'll just take Mr. Berliner's sign card down so there's no mistaken identity here.

Hanspeter Walter, San Luis and Delta-Mendota Water Authority. Good afternoon.

The same question for each of you. I guess we could start with Mr. Brobeck.

Mr. Brobeck, is it your understanding that DWR and Reclamation are seeking approval of future water transfers through this WaterFix change petition?

WITNESS BROBECK: Yes. Eventually, if this thing is built, it will be used by the major water contractors on both sides of the Delta.

MR. WALTER: Okay. And Ms. Vlamis? I'm sorry if I --

WITNESS VLAMIS: No, that was good.

MR. WALTER: Same question.

WITNESS VLAMIS: I do, and I base it on what's been provided, which is what we have to work with. And what I didn't get to tell them, I mean, Alternative 4 in their own document says that. So, I mean, we're not making it up. It's not some, like, radical idea from the north. This is in their own document.

MR. WALTER: When you say "their own

document," are you referring to the WaterFix change petition?

WITNESS VLAMIS: FDEIS and the Recirculated EIR, it's in there.

MR. WALTER: So you are not referring to the WaterFix change petition?

WITNESS VLAMIS: I am referring to the documents that are fueling this water change petition. And it's the only place that we've been able to find what the source water might be.

MR. WALTER: Okay. I have no further questions.

CO-HEARING OFFICER DODUC: Any other questions for these two witnesses?

(No response)

CO-HEARING OFFICER DODUC: Not seeing any, any redirect, Mr. Jackson.

MR. JACKSON: No.

CO-HEARING OFFICER DODUC: Then I thank you very much for your time and for providing your input. You may leave.

Now, since the Department has already completed their questioning of Dr. Svjold and Mr. Shutes, does anyone else have questions for them?

Mr. Herrick does. Okay. Short? All right.

I will forget this little game because I think we can wrap it up today in any case. So with that I'll ask the Department to come back up to complete their cross-examination.

CROSS-EXAMINATION BY MR. BERLINER (Resumed)

MR. BERLINER: I just have a few more questions for Mr. Jennings. We're going to move on beyond the water quality issues.

Mr. Jennings, in your testimony, you had stated that there has been a declining trend in flow. Do you recall that testimony?

WITNESS JENNINGS: In specific, can you -- how I phrased it?

MR. BERLINER: Sure. You indicate -- and perhaps we should pull up the testimony; that might be the easiest. If we could pull up CSPA 2 at Page 16, please.

WITNESS JENNINGS: Oh, you're talking about unimpaired flow?

MR. BERLINER: You see the paragraph there?

WITNESS JENNINGS: Yes.

MR. BERLINER: What is the basis for your statement that there's been a continuing decline in flow?

WITNESS JENNINGS: Well, basically I look --

pulled off the water classification indices, and they've got -- off of DSR -- I mean DWR, I've got -- it's one of our exhibits. And they've got the flow in those years. And so I simply averaged the flow over units the last 12 years versus the DSM period of record or the CalSim model period.

MR. BERLINER: And are you referring to the Eight River Index?

WITNESS JENNINGS: The unimpaired -- well, what is the -- what exhibit was that?

WITNESS SHUTES: It's 22.

WITNESS JENNINGS: Yeah, you might want to pull up CSPA 22.

MR. BERLINER: About this exhibit, did you understand this to be the unimpaired index?

WITNESS JENNINGS: Well, I mean, basically, it's a water-year hydraulic classification indices based on measured unimpaired runoff.

MR. BERLINER: And do you understand this to be the -- what's referred to as the Eight River Index or the unimpaired index?

WITNESS JENNINGS: Well, it's certainly -- for the Sacramento Valley and San Joaquin Valley are separate indexes.

MR. BERLINER: Another thing you discussed in

your testimony was the 16-year time period that was used in the DSM2 analysis and contended that it didn't represent the 82-year period or was not a good surrogate for the 82-year period in CalSim.

What's the basis for that statement?

WITNESS JENNINGS: I'm just looking at -- at the unimpaired runoff by these figures is that it was -- it was less than that total period CalSim models.

MR. BERLINER: But did you do any statistical analysis to determine --

WITNESS JENNINGS: No.

MR. BERLINER: -- whether --

WITNESS JENNINGS: No, it's just what it is. And what I was trying to show is the last 12 years have been exceptionally dry and that, with the continuing trend, is that you -- you base your modeling on historical averages at risk.

MR. BERLINER: You also had some critical words for the use of the CalSim II model. Are you familiar with the independent review panel for California WaterFix, the Aquatic Science Review Panel?

WITNESS JENNINGS: I think I've read it.

MR. BERLINER: You read their report?

WITNESS JENNINGS: Yeah, but --

MR. BERLINER: And did you read the part on

Page 3 of the report where they said that the CalSim and DSM2 models were the best available science?

WITNESS JENNINGS: I -- I read that.

MR. BERLINER: And that those were the models that were used for the biological assessment and that they were the appropriate models and the analytic method that was used was appropriate?

WITNESS JENNINGS: I read that.

MR. BERLINER: I don't have any other questions for Mr. Jennings.

FURTHER CROSS-EXAMINATION BY MS. ANSLEY

MS. ANSLEY: I have a couple questions for Mr. Cannon. And by "a couple," I really mean maybe three. Topic-wise, it's the analysis he did just grossly and then a question about water temperatures.

Good afternoon, Mr. Cannon.

WITNESS CANNON: Hello.

MS. ANSLEY: I making sure where you were over there.

Did you perform any technical analysis of the impacts of the WaterFix?

WITNESS CANNON: Informally, in reviewing the analyses that were done, and then I added many small specific analyses for specific hypotheses or conclusions.

MS. ANSLEY: Did you do any modeling?

WITNESS CANNON: Statistical modeling. I'm a statistician. That's where you use real data.

MS. ANSLEY: Okay. Can you point out where you did statistical modeling or statistical analysis, pardon me?

WITNESS CANNON: I've done it in a lot of things, in the fish, certainly, and then in water temperatures, some inflows. Just depends on what I was working on at the time, what data set I was looking at.

MS. ANSLEY: For purposes of your testimony here today?

WITNESS CANNON: No, my testimony is far more general.

MS. ANSLEY: Okay. So you did not perform any technical analysis or modeling of impacts of the California WaterFix on the Delta?

WITNESS CANNON: Yeah, I looked at every aspect of the WaterFix, specifically what was being suggested as impacts from the testimonies and then a couple of very specific ones, like water temperature, for example, and the effects of the tunnels on the unimpaired flows in the winter. That's where you see my specific things in the last paragraph.

MS. ANSLEY: And this is based on your review

of the data that's available; you, yourself, did not collect any additional data? You didn't do any additional model runs?

WITNESS CANNON: It's almost all CDEC or USGS.

MS. ANSLEY: I understand. Okay. Looking at Page 5 of your testimony.

WITNESS CANNON: I don't have Page 5.

MS. ANSLEY: Do you have it there?

WITNESS CANNON: Yeah, I only have four pages.

MS. ANSLEY: Oh. Well, we can bring it up on the screen.

The paragraph under where you talk about "Statement on Delta Operations of CVP, SWP," do you see that?

WITNESS CANNON: The first paragraph?

MS. ANSLEY: The first paragraph under that heading.

WITNESS CANNON: Yes.

MS. ANSLEY: And you talk about impacts of operations on water temperatures in the lower Sacramento River and further downstream at the Rio Vista Bridge. Do you see that?

WITNESS CANNON: Yes.

MS. ANSLEY: And then you make an opinion that the lower net flows of the WaterFix may have an impact

on water temperatures? Do you see that?

WITNESS CANNON: Yes. It's a subject I've covered before in CALFED and other venues and also in one of my blog posts.

MS. ANSLEY: Okay. My question is simply isn't it true, based on a number of studies -- and I'm happy to get into them -- that the primary driver of water temperatures in the Delta is ambient air temperature --

WITNESS CANNON: That's what the --

MS. ANSLEY: -- and not flow?

WITNESS CANNON: That's what the State water contractors' consultants want you to believe.

MS. ANSLEY: Are you familiar with the current literature on water temperatures in the Delta?

WITNESS CANNON: I'm very familiar with it. I've done a lot of analyses, and I've found plenty of statistical evidence, significance that water temperatures can increase at Rio Vista based on operations.

MS. ANSLEY: Do you cite that evidence here?

WITNESS CANNON: Yeah, I gave the conclusion here. I said that the temperature at Rio Vista can be higher if you reduced the flow of water at the tunnels.

MS. ANSLEY: Did you provide a basis for that

conclusion?

WITNESS CANNON: No, I did not provide all the analyses that I did.

MS. ANSLEY: Okay. That's all the questions I have for you. Thank you very much, Mr. Cannon.

WITNESS CANNON: Okay.

MS. ANSLEY: Now I just have a couple questions for Dr. Lee, who has been patiently sitting there all afternoon. I have a question on -- or two on the analysis that he did to reach his conclusions.

I have -- this is all tied off of topics in his testimony, doesn't go really beyond the scope of what he provided in direct -- a question about the water constituents analyzed by the DWR for the WaterFix and then one or two specific questions each about dissolved oxygen, phosphorus, and Stockton, City of Stockton conclusions that he reaches in his own testimony. I don't anticipate it will take longer than 20 minutes at most.

Good afternoon, Dr. Lee. Can you make sure that you're speaking into your microphone.

WITNESS LEE: Go ahead.

MS. ANSLEY: Thank you. Having reviewed your testimony and the cites in your testimony, did you do any specific analyses or modeling specific to

determining impacts of the California WaterFix on water quality standards in Delta?

WITNESS LEE: Specific modeling?

MS. ANSLEY: Yes.

WITNESS LEE: No, I simply examined the data that we had collected as part of the low DO project.

MS. ANSLEY: Thank you.

CO-HEARING OFFICER DODUC: Dr. Lee, if you could bring the microphone closer to you. Thank you?

WITNESS LEE: Thank you.

MS. ANSLEY: Now in your testimony, you -- you state that the DWR and the USBR relied only on the exceedance of a limited number of water quality objectives in evaluating the impact of the diversions in the Delta; is that correct?

WITNESS LEE: Yes, I said that.

MS. ANSLEY: And then you go on to say that one of the most important deficiencies in the assessment was that unrecognized and unregulated pollutants were not recognized. Do you recall that?

WITNESS LEE: Yeah, that's in the testimony. I didn't make that comment today, but yes, I'm familiar with that.

MS. ANSLEY: And I am referring to your written testimony. I understand.

WITNESS LEE: Okay.

MS. ANSLEY: And are you aware that the environmental review for BDCP and the Cal WaterFix did do a constituent screening analysis of 182 constituents, including a number of unregulated pollutants, which was Appendix 8C?

WITNESS LEE: Yeah, I -- I read through those and saw those statements in that report.

MS. ANSLEY: And is it your understanding as well that the environmental review for the California WaterFix also looked at dissolved oxygen, phosphorus, and -- well let's just start with dissolved oxygen and phosphorus. Are you aware that those were also analyzed?

WITNESS LEE: I believe so, yes.

MS. ANSLEY: Thank you.

And I believe that you also generally testified that -- similar to other witnesses here today, that the Sacramento River is less polluted than the San Joaquin River with -- in general, I think your testimony said pollutants; is that correct?

WITNESS LEE: Yes.

MS. ANSLEY: And are you also aware of research that demonstrates higher levels of ammonia in the Sacramento River?

WITNESS LEE: Below Sac Regional. That's going to change, though, but that's something else.

MS. ANSLEY: Is it your understanding that ammonia is a very high oxygen-demanding substance?

WITNESS LEE: It has an appreciable oxygen demand when oxidized.

THE REPORTER: I'm sorry. Can you repeat that?

WITNESS LEE: It has an appreciable oxygen demand when oxidized.

MR. OCHENDUSZKO: Dr. Lee, we really apologize, but you've got to get really close to those microphones.

WITNESS LEE: All right.

MR. OCHENDUSZKO: Thank you very much.

WITNESS LEE: Hope it doesn't taste bad.

CO-HEARING OFFICER DODUC: Have you fed your witnesses, Mr. Jackson?

MR. JACKSON: Very little.

MS. ANSLEY: I believe on Page 19 of your testimony, you provided an opinion that reduced pumping in the South Delta under the WaterFix can be expected to reduce the flow of water throughout the South Delta channel and cause greater dissolved oxygen than would occur under the no-action alternative? Do you recall

that?

WITNESS LEE: It's in the report, yes. We didn't get into that today. We didn't have time.

MS. ANSLEY: I understand. Do you present any evidence in your testimony analyzing the impacts of Alternative 4A in the California WaterFix in comparison to the no action alternative?

WITNESS LEE: I did not get into the review of the various alternatives other than just in general looking at the no action alternative as an example. And the others would not make -- I mean, they make a difference, but it's not the issue of concern.

MS. ANSLEY: Wasn't the Stock water waste -- excuse me.

Wasn't the Stockton Wastewater Treatment Plant a significant contributor to dissolved oxygen issues in the deep water shipping channel?

WITNESS LEE: What was the first part of your question?

MS. ANSLEY: In your testimony, you discussed dissolved oxygen levels in the deep water shipping channel; is that correct?

WITNESS LEE: Yes, I did.

MR. WALTER: And I don't recall seeing in your testimony mention of the Stockton Wastewater Treatment

Plant.

WITNESS LEE: I don't know that I specifically mentioned that, although I'm very familiar with it.

MS. ANSLEY: Wasn't the Stockton Wastewater Treatment Plant a significant contributor to dissolved oxygen issues in the deep water shipping channel?

WITNESS LEE: It used to be when it had high ammonia discharges.

MS. ANSLEY: On Page -- moving just down to phosphorus, I have one or two questions on phosphorus, and I have one question on the City of Stockton.

In your testimony, you claimed that the WaterFix diversions will reduce the amount of Sacramento River water that enter the Central Delta and impact the phosphorus in the Central Delta, phosphorus levels?

WITNESS LEE: Yes.

MS. ANSLEY: Are you familiar with what the long-term average concentrations of phosphorus are in the Sacramento River near Freeport and the San Joaquin River near Vernalis?

WITNESS LEE: Specifically the values, no.

MS. ANSLEY: Okay. That's fine. Are you aware that recent studies by the Central Valley Regional Water Control -- Water Quality Control Board

found similar concentrations between the two rivers?

WITNESS LEE: I'm sorry. I don't understand.

MS. ANSLEY: Are you familiar with the recent study by the Central Valley Regional Water Control Board that measured total and dissolved phosphorus concentrations throughout the Delta?

WITNESS LEE: No.

MS. ANSLEY: Okay. So you're not aware that that study found that concentrations are comparable at Hood on the Sacramento River and Vernalis on the San Joaquin River.

MR. JACKSON: I'm going to object and move to strike the question. He answered that he wasn't familiar with it, and now she's reading it into the testimony.

MS. ANSLEY: Well --

CO-HEARING OFFICER DODUC: Hold on. Finish your question, Ms. Ansley.

MS. ANSLEY: Okay.

So regardless of whether you're familiar with that study, are you familiar that there has been findings that -- that dissolved -- that concentrations of total phosphorus and dissolved phosphorus are comparable at Hood on the Sacramento River and Vernalis on the San Joaquin River and, actually, Turner Cut on

the San Joaquin River?

WITNESS LEE: I'm not familiar with that study.

MS. ANSLEY; then finally, in your testimony, you state an opinion that the intake of the proposed WaterFix on the City of Stockton's intake should have been evaluated. Do you recall that?

WITNESS LEE: Yes, I -- I've -- DWR and USBR should have evaluated the impact of proposed moving the intake to the tunnels around the Delta and the impact of this on the Delta water quality.

MS. ANSLEY: Okay. I'd like to ask you specifically about your testimony about Stockton's intake. I think I might have said something incorrectly.

So on Page 22 of your testimony, you state that the impact of the proposed WaterFix on Stockton's intake should have been evaluated; is that correct?

WITNESS LEE: Yes, and in my testimony today, in the verbal testimony, I specifically pointed out the location on the deep water ship channel just downstream of Station 4 that DWR uses in their monitoring of the channel.

MS. ANSLEY: Would that station be Buckley Cove?

WITNESS LEE: I don't know it by that name. I just know it by the DWR location in their -- on the map that I showed of theirs. I don't know that's -- I don't know by name.

MS. ANSLEY: I might not have gotten the name correct. So you were not aware that the -- that the environmental review for the California WaterFix did indeed assess water quality in locations upstream and downstream of Stockton's intake?

WITNESS LEE: I think I heard something about that, but I have not seen a proper evaluation of that issue by them.

MS. ANSLEY: I believe I have no further questions. Thank you.

Thank you for your patience, Doctor.

CO-HEARING OFFICER DODUC: Does that complete your cross-examination?

MS. ANSLEY: Yes.

CO-HEARING OFFICER DODUC: All right. State Water Contractors? Oh, you have said, Ms. Sheehan, that you do not have any cross-examination.

Mr. Walter, any additional cross-examination?

MR. WALTER: Yes.

CO-HEARING OFFICER DODUC: Then I also have Mr. Herrick and Mr. Keeling.

MR. KEELING: Five minutes, if that.

CO-HEARING OFFICER DODUC: Okay.

FURTHER CROSS-EXAMINATION BY MR. WALTER

MR. WALTER: Okay. Good afternoon again. Hanspeter Walter for the San Luis and Delta-Mendota Water Authority.

I just have some questions for Mr. Jennings. So, Mr. Jennings, you have testified that CSPA owns 14.35 acres of land at Collinsville, correct?

WITNESS JENNINGS: That's correct.

MR. WALTER: Okay. Could we please bring up San Luis and Delta-Mendota Water Authority Exhibit 9 on the screen?

And while that's happening, I'll let you know that that is CSPA's protest filed in this proceeding.

And if we could, could we scroll all the way down -- I know it's a lengthy protest, but there's an Attachment B that has an aerial photo. I don't know if the table of contents will let us know what page that's on.

Keep going down.

WITNESS SHUTES: It's not ours.

There.

MR. WALTER: No, that is -- is that -- is that San Luis 9 from my -- which was on the flash drive I

gave you guys this morning or --

MR. LONG: Yes.

MR. WALTER: Oh, sorry. 10, let's go to 10 then. That was a different protest. There's so many. Okay. Could we zoom in on that aerial image there?

Okay. Mr. Jennings, does this image depict the 14 and approximately half acres that you're referring to as CSPA's?

WITNESS JENNINGS: Approximately.

MR. WALTER: When did CSPA acquire this land?

WITNESS JENNINGS: When did we acquire that land?

CO-HEARING OFFICER DODUC: Do you recall, Mr. Jennings?

WITNESS JENNINGS: You know, that's an interesting question. I've -- a decade ago perhaps? That was -- it was actually a gift. And Jim Crenshaw, our president, handled that. And so I just know we have a tax bill every year.

MR. WALTER: Okay. So about -- let's see. It actually consists of three parcels of land. Three separate --

WITNESS JENNINGS: Yeah.

MR. WALTER: -- assessor parcel numbers. But those are not depicted on this -- the red line

presumably encompasses all three, but you don't have the individual parcels on delineated on this?

WITNESS JENNINGS: No. I'd be happy to provide that information if it's needed.

MR. WALTER: I'm just curious. Are all three parcels adjacent to the water bodies on this map? Or is one, you know, up on the other side -- I guess, you mentioned a levee. I'm assuming the levee you mentioned was kind of along that what looks like a road here in the photo?

WITNESS JENNINGS: I can't answer that. I mean, in the sense that the road, Collinsville Road extends down so that DWR can have access to their Collinsville gauge.

MR. WALTER: Okay. Well, Mr. Crenshaw, when he gifted it to CSPA, were there any requirements or restrictions or purposes for that gift that he attached to the gift of the land?

WITNESS JENNINGS: No. Mr. Crenshaw is my president. And he was -- he handled -- there was a lady, an estate of a lady that provided that. As I understand it, there are no restrictions on that land.

MR. WALTER: Do you know when Mr. Crenshaw came into ownership of, I guess, the three parcels?

WITNESS JENNINGS: Well, Mr. Crenshaw, as

president of the CSPA -- CSPA doesn't own it. The organization owns it.

MR. WALTER: Right. But I thought you testified that Mr. Crenshaw gifted it to CSPA?

WITNESS JENNINGS: No, no. He handled the negotiations that the transfer was made.

MR. WALTER: Okay. So who -- somebody gifted it to CSPA though?

WITNESS JENNINGS: Yes, and I think I mentioned that I can't remember the lady's name that did.

MR. WALTER: Okay, okay. You testified earlier, I think, to Mr. Berliner that you're not making any use of the land other than the lease to DWR for the Collinsville gauge.

Do you know when Collinsville will make a decision? You've had it for ten years here.

WITNESS JENNINGS: Well, we've discussed it. You know, tom and I have discussed the possibilities of a mitigation bank, several options there. That is good riparian habitat on the outside of that levee. So there is some beneficial use occurring.

MR. WALTER: Okay. And you have testified or -- in your oral and I think, here today also -- or your written testimony and orally here today that you're

claiming riparian water rights to all three parcels of land?

WITNESS JENNINGS: I don't think I clarified that I'm claiming all three parcels of land, since I'm not prepared to identify the specific parcel boundaries.

But I will be delighted to get back to you with that information.

MR. WALTER: Okay. So as we stand today, though, you have not presented any chain of title documents or any other documentation, even a deed to these three parcels that might confirm a riparian right on any of the three parcels?

WITNESS JENNINGS: Well, I'm assuming that, since we owned the 14 acres and since we're against the water, I guess some part of that does abut the water, which would carry with it riparian rights.

MR. WALTER: Okay. I think my final question, then, is you -- well, let's just make sure I heard you accurately. Currently you're not using any water, you're not exercising any claimed right to water on any of those three parcels; is that correct?

WITNESS JENNINGS: We're not diverting. I mean, obviously there's a riparian benefit on the outside of that levee, but we're not actively diverting

at the location yet.

MR. WALTER: And you have no diversion structure at that location; is that correct?

WITNESS JENNINGS: I don't know that I can answer that, whether there was a historical diversion structure that we've not noticed that's been obsolete or not used, so I don't know.

MR. WALTER: Okay. You've made no plans to construct a new diversion structure or anything like that or embarked on any proceedings or processes to do that?

WITNESS JENNINGS: Well, yes. In fact, if we use it as a mitigation bank or if we use it as some -- there are a lot of options that we've talked about that would necessitate establishing if there's not one there establishing a point to convey the water.

MR. WALTER: I guess what I mean is, for instance, you haven't approached the Department -- California Department of Fish and Wildlife to seek a stream bed or lake alteration agreement that would allow a new diversion structure to be constructed somewhere on that property or taken any other real tangible steps to build a diversion facility to use this claimed riparian right?

WITNESS JENNINGS: Well, I wouldn't --

wouldn't build a diversion -- assuming that there's not one already there. That I -- I wouldn't -- wouldn't think that we would spend resources to build a diversion structure before we had a purpose of use for the water.

MR. WALTER: Okay. And the only reason I'm asking all of this is just to be very clear in my understanding of the alleged injury that CSPA is claiming in the Part 1. And so let me just try to paraphrase what my understanding is of your claim of injury and see if you can confirm that you're, in effect, claiming that the current injury is that CSPA is unable to decide how to use its claimed riparian rights because of the uncertainty created by the WaterFix petition?

WITNESS JENNINGS: Well, the uncertainty created by the water quality conditions, the impending long-delayed Water Quality Control Plan Update that we presume will make some changes to WaterFix's project just confused that.

You know, before we make a firm decision on how to best use our property, we would like the quality of the water surrounding that property to have -- to have some reasonable stability that what we can expect going forward.

MR. WALTER: Okay. I have no further questions. That concludes any questions for the panel.

CO-HEARING OFFICER DODUC: Mr. Herrick? Actually, Mr. Herrick, would you mind if Mr. Keeling goes first?

MR. HERRICK: No.

CO-HEARING OFFICER DODUC: Mr. Keeling, since you said you had maybe five minutes at most?

MR. KEELING: It may be less than that.

CO-HEARING OFFICER DODUC: Okay.

CROSS-EXAMINATION BY MR. KEELING

MR. KEELING: My only questions are for Mr. Jennings.

Mr. Jennings, good afternoon, Tom Keeling on behalf of the San Joaquin County protestants. Do you recall that earlier, when you were being cross-examined I believe by Mr. Berliner, you were asked about relative loads of certain contaminants, of ammonia, for example, on the Sacramento and the San Joaquin? Do you recall that?

WITNESS JENNINGS: Yes.

MR. KEELING: I was a little confused in your responses. Were you talking about concentrations or absolute quantities? Could you explain your answer there?

WITNESS JENNINGS: Well, for ammonia, certainly the Sacramento Regional Wastewater Treatment Plant has been targeted as a major discharger of ammonia and are under a current NPDS permit, or under requirements to significantly upgrade. They're going to tertiary treatment -- nitrification, denitrification -- that should greatly, if not completely, resolve that problem.

MR. KEELING: Did this question of concentration of these contaminants take into account the relative quantities of water flowing from the two rivers into the Delta?

WITNESS JENNINGS: Well, but you would have to look at the concentration and the load. But -- and so, you know, I'm not sure right now off the top of my head what the concentration is.

MR. KEELING: You were asked by Mr. Berliner about specific constituents where the question was -- he had asked you if these were not heavier in the Sacramento flows than in the San Joaquin flows.

And I want to go back to your statement about cleaner water, in effect, from the Sacramento. What types of constituents were you talking about where the constituent loads or concentrations would be heavier from the San Joaquin than the Sacramento?

WITNESS JENNINGS: Well, the San Joaquin receives runoff from agriculture -- irrigated runoff from the Westside of the San Joaquin Valley. And so that's been a problem, I mean, in that there's not much of a connection between the San Joaquin River upstream of the confluence with the Merced. And so the tributaries, primarily the Stanislaus, has to employ dilution flows to try to dilute the salts, the selenium, boron that is discharged by west side agriculture.

MR. KEELING: Besides stolen jump and boron can you think of any other constituents that would be heavier in San Joaquin than Sacramento typically?

WITNESS JENNINGS: Well, salts in general. I mean, arsenic, a lot of arsenic is coming out of the -- leaching out of those soils as well.

MR. KEELING: I have no further questions. Thank you.

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

Now Mr. Herrick.

CROSS-EXAMINATION BY MR. HERRICK

MR. HERRICK: Thank you, Chair Doduc and Chairman Marcus and Board Members and staff. John Herrick, South Delta parties. I will be as short as I

can, but it will take 20 minutes or so. Maybe I was going to start with Dr. Whitelaw, so I won't.

MR. HERRICK: Oh, I'm sorry, I released him for a moment. I'll go get him.

CO-HEARING OFFICER DODUC: He's coming back.

MR. HERRICK: That's no problem. When he comes back, that will be fine.

I'd like to start with Mr. Shutes, please.

Mr. Shutes, your testimony deals with carryover requirements for various reservoirs on the Sacramento River system, correct, in general?

WITNESS SHUTES: A lot of it does, yes.

MR. HERRICK: And pursuant to other questioning, there are certain biological opinion requirements that deal with such carryover; is that correct?

WITNESS SHUTES: On the Shasta river -- on the Shasta Reservoir, yes.

MR. HERRICK: Do those -- in the past, have those carryover requirements been sufficient to allow the projects to meet their downstream obligations?

WITNESS SHUTES: In some cases, yes. In other cases, not.

MR. HERRICK: And do those carryover requirements require any amount of water be carried

over in order to meet the Western Delta Ag standard?

WITNESS SHUTES: Not -- it's not my understanding that they do, and it's not my understanding that they look any farther than, in an absolute sense, than the existing year.

MR. HERRICK: And those requirements may also require that -- those requirements may mandate a meeting of an X2 in some times of the year, correct?

WITNESS SHUTES: Correct.

MR. HERRICK: But those don't specify any carryover in order to meet that X2, do they?

WITNESS SHUTES: They do not.

MR. HERRICK: And have those carryover standards allowed the Bureau and DWR to meet their various water quality obligations in of the Delta in the years of 2013 first, to your recollection?

WITNESS SHUTES: I don't recall about 2013.

MR. HERRICK: How about 2014?

WITNESS SHUTES: They did not. In January of 2014, the project sought a temporary urgency change petition which was in effect throughout the year.

MR. HERRICK: And 2015?

WITNESS SHUTES: Definitely not. Another temporary urgency change petition.

MR. HERRICK: And you mentioned temporary

urgency change petitions, and you had a question that dealt with a necessary finding about whether or not that petition would injury other legal users; do you recall that questioning?

WITNESS SHUTES: I do.

MR. HERRICK: Now, in your opinion, is it reasonable to conclude that a relaxation of a water quality objective for the protection of agricultural beneficial uses could be found to result in no harm?

WITNESS SHUTES: That doesn't seem to make sense to me.

MR. HERRICK: In order to make that determination, one would first have to estimate what the water quality would be with the relaxation, correct?

WITNESS SHUTES: Both with and without, yes.

MR. HERRICK: And then you'd have to see whatever degree of -- then you'd have to determine the projected water quality, what that effect on any particular user might be, correct?

WITNESS SHUTES: Yes.

MR. HERRICK: Are you aware that the TUCPs in the last few years did such an analysis?

WITNESS SHUTES: I didn't focus on that, so I don't know the answer to that.

MR. HERRICK: Mr. Shutes, you acknowledge that CalSim II is purportedly used in a comparative mode not really a predictive mode; is that correct?

WITNESS SHUTES: That's correct.

MR. HERRICK: So if in this proceeding we only have a comparative analysis, do we or do we not have any analysis that predicts what storage might be?

WITNESS SHUTES: What storage might be?

MR. HERRICK: With the project, sorry.

WITNESS SHUTES: I don't think that we really have a sense, even on a comparative basis.

MR. HERRICK: And in order to determine whether a certain amount of carryover storage harms a legal user, don't we need to know what the carryover storage would be in any particular circumstance?

WITNESS SHUTES: I think you would need to know what the rules are that govern carryover storage, and you would have to look then at the application of those rules over a series of water years and evaluate what happened or what would happen given those levels of carryover storage.

MR. HERRICK: Yes. And the question I was trying to get to is a comparative analysis might tell you that there will be a difference, either more or less, but that doesn't tell you what the amount of

water is available and, thus, how much water is available for the users, correct?

WITNESS SHUTES: Correct.

MR. HERRICK: So we don't really know from the analysis presented by the petitioners what carryover storage effects are on legal users.

WITNESS SHUTES: I think I follow you, and I think that's correct.

MR. HERRICK: Sorry for going fast.

I see Dr. Whitelaw's back.

Dr. Whitelaw, I have a couple questions for you, please.

WITNESS WHITELAW: Okay.

MR. HERRICK: Very briefly, I don't think it was covered well enough in your oral presentation. Would you please explain the definition of a risk-averse farmer and a risk-neutral farmer in the Delta in this situation?

WITNESS WHITELAW: Let me take it away from the farmer and just give you the general, and then you and I together can try to apply it back to a farmer if you want to.

So let's say you have a game of chance, and you're risk neutral. You will be indifferent between wing $10 and losing $10. If you're risk-averse, you

won't be indifferent. You don't want to lose. Now, there will be different weights associated with that. But that distinction qualitatively is unequivocal.

So then change the game of chance -- well, actually, I grew up on a farm. So in any event, take it over into some agricultural production on either a very small plot or a big one, and the same principles apply.

MR. HERRICK: And when you provided alternate language for one of the paragraphs to your testimony, I think you covered that or tried to explain that in that is it correct to say that, if a project results in sometimes having a benefit and sometimes having a detriment, that doesn't mean it evens out, correct?

WITNESS WHITELAW: Correct.

MR. HERRICK; so in order to determine whether or not there's harm, you have to go through a series of analyses which include, number one, identifying the change; is that correct?

WITNESS WHITELAW: Yes.

MR. HERRICK: And, number two, you would then identify who might be affected by that change, correct?

WITNESS WHITELAW: Exactly, exposure and risk. And just to make sure we're communicating, uncertainty has -- you and I haven't addressed uncertainty yet.

MR. HERRICK: Correct. I haven't gotten to that.

WITNESS WHITE LAW: Oh, okay.

MR. HERRICK: The next thing one would do is to say, okay, this change applies to this person. But then you would have to determine what that change does to that person, correct?

WITNESS WHITELAW: Yes.

MR. HERRICK: So a small change, one may conclude it doesn't have much effect, but a larger change might, correct?

WITNESS WHITELAW: Yes.

MR. HERRICK: And until one does that sort of analysis, one does not know if the change harms a legal user, correct?

WITNESS WHITELAW: Exactly.

MR. HERRICK: Have the petitioners done any sort of analysis like that to your knowledge?

WITNESS WHITELAW: None to my knowledge.

MR. HERRICK: And we know that they presented evidence on average salinity changes in the Delta. Do you recall that?

WITNESS WHITELAW: Yes.

MR. HERRICK: Is that the same thing as going through the analysis we just had which would determine

what particular changes might affect what particular people and what the degree of effect would be?

WITNESS WHITELAW: After the first three or four words, you're spot on. At the very beginning -- well, I mean, it's not incorrect. But the averaging that took place at the beginning -- let me just -- quick side bar? It's not a joke.

So if you're at a temperature of say, 30 degrees and you have a slight decrease in water, some amount of water. And now you doubled the temperature and you have an equal decrease in water, those need not be the same physical effects.

And so how and at what level you do your averaging can affect the outcome of the rest of your paragraph.

MR. HERRICK: And for purposes of this change petition, there are numerous different potential impacts that would need to go through the analysis we just covered, correct?

WITNESS WHITELAW: Bingo.

MR. HERRICK: Not salinity, but things like temperature, as you just said, correct?

WITNESS WHITELAW: Right.

MR. HERRICK: And then maybe other constituents that might be in the system that might

affect somebody?

WITNESS WHITELAW: Yeah, Dr. Lee's -- he illustrated that quite well. And it can differ among types of legal users.

MR. HERRICK: And lastly, as you mentioned earlier, there's a risk factor involved; is that correct?

WITNESS WHITELAW: Yes.

MR. HERRICK: So once you go through this analysis or as you go through it, you also have to put some sort of, what, number or something on the risk of any potential effect occurring; is that correct?

WITNESS WHITELAW: Yep.

MR. HERRICK: Have the petitioners, to your knowledge, done any sort of analysis like that?

WITNESS WHITELAW: To my knowledge, nothing like that.

MR. HERRICK: Thank you.

This is for Dr. custis, please.

MR. JACKSON: I'm -- could we correct -- we had a problem earlier in the hearing calling somebody doctor who wasn't completely a doctor.

MR. OCHENDUSZKO: Mr. Jackson, could you please use the microphone?

MR. JACKSON: Yes. Could you call him

Mr. Custis, please? He has a master's.

MR. HERRICK: I apologize for that. I wrote it down incorrectly.

Mr. Custis, your testimony, sort of boiling down part of it, was that for water transfers in the Sacramento Valley, that when it involves substituted groundwater, 70 to 80 percent of that amount of the transfer is -- is a depletion from the surrounding channels over time; is that correct?

WITNESS CUSTIS: Over time, that would be correct.

MR. HERRICK: Isn't that nuts? I mean, that you would pump water out of the ground for use to supply transfer and then have 70, 80 percent of that leave the river over time?

WITNESS CUSTIS: That's the current -- the current pumping that's occurred in the valley without a transfer, and that's what it's doing. So that's just a consequence of pumping groundwater.

Now, the fact that it doesn't come out instantly, as if you had a surface water diversion, is what sort of gives it the appeal because you delay -- you don't immediately see the water loss in the river. And then once you stop pumping, you assume that, well, I'm not responsible anymore for that loss. But in

truth, you are. It just plays itself out over time.

And what's happening, why you see long-term average, is that every time you turn on the pump and then stop, you get this residual loss out of the river. But then you turn it back on again, and it starts up again. So those things actually accumulate over time. It's called cyclic pumping. Eventually, you know, it ends up 70, 80 percent.

So that's -- and the difference also is the averages that -- back for averages, the averages that we get from DWR reports and the CH2M Hill combine all of the wells into one number. Well, in truth in depends on how close the well is to the river. Wells that are closer to the river have a much more rapid response in the river, but they also have a less residual time.

So in other words, you're trying to get 95 percent of the water you pumped out of the river.

Now, it could come from somewhere else, but it would have to be above the natural condition. So the precipitation that you always see, that's not a bonus. It's not like it suddenly gets to fill that hole. Or you lose storage. And that's what you've seen in the valley, this 300 acre-feet a year of storage loss right now, at least.

MR. HERRICK: So for any particular transfer that involves such groundwater substitution, there's actually a net increase in water use. It's not just the substitute water being transferred, but then there's water being lost from the channel also, correct? So the person who sells the water still uses groundwater and the sale water that moves to someone else. So there's a double use of that water; is that correct?

WITNESS CUSTIS: I think you can say that. One of the interesting things is that, if I pump groundwater without the transfer part, part of that water goes back into the reservoir, goes back into the ground. So my consumptive use is just the part that the plants use.

But the problem with the transfer is is that I used to irrigate. So now that infiltration water is gone, and I'm pumping. So I don't get credit for the fact that I've infiltrated groundwater because I've taken it out by not -- by removing it as surface water. So in a sense, you're right; you get a double consumptive use.

MR. HERRICK: So hypothetically, if there were State and Federal laws that precluded that increase in consumptive use in a transfer, such transfers in the

Sacramento Valley wouldn't occur, would they?

WITNESS CUSTIS: You would have to pay for it as a double use.

MR. HERRICK: I had one more, just escaped me. Excuse me for one second.

Do you know whether or not this 70 to 80 percent depletion of the stream is part of the CalSim modeling?

WITNESS CUSTIS: No, I don't know whether that's a part of it.

MR. HERRICK: Thank you. That's all the questions I have for you.

Dr. Lee, I have just a couple questions for you, please. You were asked a few questions about the relative concentrations of constituents in the Sacramento River and the San Joaquin River. Do you recall that?

WITNESS LEE: Yes.

MR. HERRICK: Is it true that constituents of concern in the Sacramento River can generally pass through the system as the Sacramento River eventually reaches either the export pumps or the Bay; is that correct?

WITNESS LEE: I'm sorry. Repeat that please.

MR. HERRICK: Is it correct that the

constituents of concern in the Sacramento River water, they eventually exit the system, generally, either to the Bay or to the export pumps; is that correct?

WITNESS LEE: Yes.

MR. HERRICK: And isn't it true that the constituents in the San Joaquin River --

WITNESS LEE: The answer to my previous question was "yes." Go ahead.

MR. HERRICK: Thank you. Isn't it true also that the constituents of concern in the San Joaquin River either collect in the South or Central Delta or are exported by the pumps generally?

WITNESS LEE: Yes. I'm not sure how much collection there is, but there are certainly impacts within the Central Delta and would be exported to some extent through the South Delta pumps.

MR. HERRICK: But One of the problems in the South Delta is that there are stagnant zones without net flow; is that correct?

WITNESS LEE: I'm not familiar with that.

MR. HERRICK: Okay. I wouldn't go into that then. Thank you.

Now, Dr. Lee, you've testified that you're concerned that less water flowing across the Delta to the export pumps will result in less assimilative

capacity in the Central Delta; is that correct?

WITNESS LEE: Well, it will increase the concentrations of various pollutants that are primarily derived from the San Joaquin River that are mixed with the Sacramento River in the Turner Cut.

MR. HERRICK: And that's because there's less Sacramento River water mixing with that San Joaquin water; is that correct?

WITNESS LEE: That's correct.

MR. HERRICK: And is it -- to your knowledge, isn't it correct to say that generally the San Joaquin River doesn't connect to the Bay because its flow is either consumed locally or exported and there isn't enough flow to overcome those two depletions of it?

WITNESS LEE: Yes, in general.

MR. HERRICK: Thank you.

Mr. Jennings, please.

WITNESS JENNINGS: I was feeling neglected.

MR. HERRICK: Mr. Jennings, are you familiar with the TMDL process?

WITNESS JENNINGS: Yes.

MR. HERRICK: And we have 303(d), listed water bodies in California for which TMDLs are implemented?

WITNESS JENNINGS: Yes.

MR. HERRICK: And the TMDLs require certain

parties to undertake certain actions to either minimize or cease contributing chemicals to certain waterways; is that correct?

WITNESS JENNINGS: Conceptually.

MR. HERRICK: That was a good one.

Now, Mr. Jennings, if hypothetically the California WaterFix has less Sacramento River water entering the central and southern Delta, does that affect the ability of people to meet the TMDL mandates?

WITNESS JENNINGS: It certainly could.

MR. HERRICK: Let me give you a hypothetical. If there's a farmer in the South Delta who is diverting water now, the chemical constituents in it that are related to a TMDL may get him in trouble if he just discharges those back into the waterway; is that correct?

WITNESS JENNINGS: That could be, yes.

MR. HERRICK: If the California WaterFix then provides less dilution in the South Delta, then the burdens on that farmer for discharging may increase; is that correct?

WITNESS JENNINGS: Well, yes. And if there's less dilution, that farmer's going to be irrigating with polluted water as well.

MR. HERRICK: Now, you've heard the

petitioner's testify that they believe that meeting D1641 standards equates to not injuring any legal user, correct?

WITNESS JENNINGS: That's correct.

MR. HERRICK: And I believe your testimony pointed out that, regardless of any other level of success in meeting D1641, the level of success meeting the South Delta standards is, shall we say, poor?

WITNESS JENNINGS: Well, "poor" would be an overstatement. Let's just -- I mean, certainly DWR and USBR have been under a longstanding cease and desist order that has expired now. And they've still not complied with it.

And so, yes, I mean, South Delta agriculture has been the orphan stepchild of Central Valley.

MR. HERRICK: You saw the presentation by the petitioners where they showed average yearly and average monthly data -- or excuse me -- modeling results indicating the results of salinity in certain locations?

WITNESS JENNINGS: Yes.

MR. HERRICK: And these are my words, not theirs. Their conclusions of their modelers were the changes are not significant, and so they concluded no harm to legal users. Do you recall that?

WITNESS JENNINGS: If you average over long enough term, you can minimize almost any problem.

MR. HERRICK: That was my next question. Then the averaging of data on salinity in the South Delta, does that allow you to conclude whether or not there will be affects on diverters in the South Delta?

WITNESS JENNINGS: No.

MR. HERRICK: The reason I asked you that is, based upon those TMDL mandates, if certain diverters have requirements to limit their discharges of salt, or their concentrations or load, does the petitioner's presentation tell us whether or not the California WaterFix will exacerbate or harm them?

WITNESS JENNINGS: No. And for example, I can find no discussion of mixing zones in the environmental documentation. You know, if you are approaching or exceeding a water quality standard you may need a mixing zone. You may not get that.

In fact, for a municipal discharger, if salts are exceeding the standard, they're technically not allowed to discharge. I mean, they're operating right now under temporary variances granted by the Board. But conceptually you can't -- you know, once you reach assimilative capacity of a constituent, there's no more room for anyone else to add to it.

MR. HERRICK: If the petitioner's modeling results that show averages -- you know, show small differences, does that allow you to determine whether or not that's an actual impact?

WITNESS JENNINGS: Well, certainly not. And keep in mind that, for many standards, or in one hour or four days or whatnot, I mean, they're not real long-term averages.

MR. HERRICK: Mr. Jennings, does the CalSPA property near Collinsville have any weeds on it?

WITNESS JENNINGS: Weeds?

MR. HERRICK: Yes.

WITNESS JENNINGS: Yeah, I -- I -- yes.

MR. HERRICK: Are those weeds habitat to that?

WITNESS JENNINGS: Some critters are luxuriating in our weeds.

MR. HERRICK: Are there any plants on the water side of the levee that are consuming water?

WITNESS JENNINGS: There absolutely are. There's good habitat on that other side.

MR. HERRICK: Do you know whether or not to groundwater under your property is connected to the river there?

WITNESS JENNINGS: I would presume that there's a connection between groundwater and the river.

MR. HERRICK: So absent some rain at any particular time, any tree, plant, weed, fungus growing on your property would actually be using water that derived from the channel, wouldn't it?

WITNESS JENNINGS: Yes.

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

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

Any further cross-examination by any other parties?

(No response)

CO-HEARING OFFICER DODUC: Not seeing any, any redirect, Mr. Jackson?

MR. HERRICK: No.

CO-HEARING OFFICER DODUC: All right. Then I thank you all.

Mr. Jackson, we will expect your list of exhibits with correction as appropriate by noon next Thursday.

MR. HERRICK: Thank you.

WITNESS JENNINGS: We did this in one day?

MR. JACKSON: They did this in one day. We would have gone on for days.

CO-HEARING OFFICER DODUC: Okay. Let's do a

bit of housekeeping before we adjourn for the week, I guess.

We've finished sooner than I thought. You know I do not like to have free days, but unfortunately, we do not have any parties lined up for tomorrow. So I trust you all find something to occupy you. But looking at next week --

MR. HERRICK: So we're not doing anything tomorrow?

CO-HEARING OFFICER DODUC: I don't have a party available for tomorrow. That is my fault and my lack of planning. So I'm going to do better from now on.

All right. Next week we are reconvening on December 8th and continuing December 9th. We will have Mr. Herrick presenting his last witness. Then we will have restore the Delta, Group 32.

Going down my list after Group 32 is Group 38, PCFFA. And then Group 37, Ms. Dierdre Des Jardins. I have nothing in the record to indicate their inavailability those days, so I will expect them to be available.

It's also possible that we might get to Group 39, North Delta CARES, and Group 41, Snug Harbor, as well.

For 39 and 41 -- hopefully you are listening to this -- North Delta CARES had requested one hour and I believe 40 minutes for their witnesses, who are not expert witnesses and who, based on my review of their written testimony, could be a lot more succinct in presenting the summary of their statement.

So I encourage you to work on that because you will not in all likelihood get 1 hour and 40 minutes for your witnesses.

Likewise, Ms. Suard, Group No. 41, you have requested two hours to present what is essentially six pages of written testimony and a six-page PowerPoint. That is also not efficient, and I encourage you to cut down your time tremendously and streamline your presentation.

With that, again, all those parties are on notice that they may be called upon next week. That is Mr. Herrick's remaining witness, Group 32, 38, 37, 39, and 41.

Starting on December 13th, on Tuesday, we will begin with Group 33, Clifton Court, Ms. Womack and her witness. Then this is a heads up to Group No. 10 and 27, the City of Brentwood and the City of Antioch requested that they postpone their case in chief pending some negotiation with the Department -- with

petitioners, I should say. They are noticed that, unless they manage to reach a settlement, I expect them to present their case in chief the week of December 13th if they still wish to do so.

And then finally, we have Group 17 remaining. I believe we will get an order out, a ruling, on the motion filed by the Department next week. So we will address that issue as well.

As you can see, my expectation is we wrap up the cases in chief by the week of December 13th, with our last hearing being December 15th, that way you may all enjoy your holidays and be prepared -- oh, we will also be issuing I believe within the next week or two some rulings regarding rebuttals. I appreciate all the suggestions and all the comment and input that have been provided. We will provide you some guidance on that before we convene on December 15th.

All right? Any question?

(No response)

CO-HEARING OFFICER DODUC: Not seeing any. All right. Have a good day off everyone, and we will see you next Thursday.

(Whereupon, the proceedings recessed at 4:03 p.m.)

STATE OF CALIFORNIA )
) ss.
COUNTY OF MARIN )

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 13th day of December, 2016.

DEBORAH FUQUA

CSR NO. 12948