E. ROBERT WRIGHT
1418 20th Street, Suite 100
Sacramento, CA 95811
(916) 442-3155 x207
bwright@friendsoftheriver.org

KYLE JONES
909 12th Street, Suite 202
Sacramento, CA 95814
(916) 557-1107
Kyle.Jones@sierraclub.org

Attorneys for protestants
FRIENDS OF THE RIVER
SIERRA CLUB CALIFORNIA

BEFORE THE

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

HEARING IN THE MATTER OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND UNITED STATES BUREAU OF RECLAMATION REQUEST FOR A CHANGE IN POINT OF DIVERSION FOR CALIFORNIA WATER FIX	TESTIMONY OF DEIRDRE DES JARDINS

I, Deirdre Des Jardins, do hereby declare:

I. SUMMARY

The State Water Resources Control Board's decision on the WaterFix Change Petition will be one of the biggest water rights decisions in 50 years, and the decision will likely govern how the State Water Project and Central Valley Project water rights are exercised for the next 50 to 100 years. To understand what permit terms and conditions might be necessary, I believe it is essential that the State Water Resources Control Board understand some historical facts about the State Water Project's diversions from the Sacramento River and the Delta.

1. The State Water Project, as originally planned, only had about half the water supplies for its contracts of 4.23 million acre-feet. State Water Project yield was also estimated to go down by almost 500,000 acre feet due to maturity of water rights in the Sacramento Valley.

2. One of the ways that the Department of Water Resources dealt with the ensuing conflict was to operate Oroville reservoir much more aggressively, risking draining the reservoir to near minimum pool in a multiyear drought. Changes in reservoir operations were not disclosed to the State Water Resources Control Board in other regulatory processes.

3. One of the causes of reverse flows in the Delta has been identified as diverting more water at the State Water Project and Central Valley Project pumps that naturally flows in the channels of the Delta.

4. The yield of the State Water Project is projected to go down further, due to the need for increased outflows to repel salinity intrusion due to sea level rise, and maturity of water rights in the Sacramento Valley.

Given these facts, granting a permit for diversion to the State Water Project of 9,000 cfs on the Sacramento River, with no bypass requirements in the permit, and no carryover storage requirements for

Oroville reservoir, seems like a bad idea, and one that is likely to lead to further conflict with beneficial needs in the Sacramento Valley and Sacramento-San Joaquin Delta, including both human uses and beneficial needs of fish and wildlife.

II. Statement of Qualifications

My name is Deirdre Des Jardins. I am the principal at California Water Research. I have previously testified in this proceeding. A true and correct copy of my statement of qualifications is submitted as Exhibit FOR-7. I have done extensive collaboration with Friends of the River looking at diversions on the Sacramento River and the Delta and the history of the State Water Project and Central Valley Project water resources planning and operations. I am providing two reports supporting Ron Stork's testimony for Friends of the River in this proceeding.

III. State Water Project Water Supply

At the time the State Water Project contracts were issued, the water resources engineers knew that the State Water Project only had the supply for about half of the contract amounts. Contracts negotiated with Metropolitan Water District in 1959 gave MWD 2 million acre feet per year, most of the estimated "dependable yield" of the facilities that were authorized by the Burns-Porter Act that year. Bill Warne, the Director of the Department of Water Resources from 1961-66, set out to sign contracts with other water agencies for another 2 million acre feet. By the time the final contract was signed in 1962, the contracts totaled 4.23 million acre feet a year, which was almost twice the estimated yield of the project. The Department of Water Resources assumed that the remaining upstream supplies for the State Water Project were to come from augmentation of Sacramento River flows from North Coast rivers and streams.

Bill Warne was interviewed by Malca Chall in 1979 for the Governmental History Documentation Project. He discussed the fact that the State Water Project only had about half the upstream water supply it needed for the contracts with the existing facilities, and the need for augmentation of Sacramento River flows.[1]

[1] Exhibit FOR-92, Bancroft Library, Regional Oral History Office, Governmental History Documentation Project, Goodwin

Plans for Augmenting the Flows of the Sacramento River System;
The North Coast

Chall: As I understood it, one of the reasons you were able to offer the additional acre-feet of water to the Metropolitan Water District was because of a plan at that time to augment the water in the Delta from the north coast.

Warne: Our expectation of augmenting the flows of the Sacramento River system that expectation dated clear back to the Burns-Porter Act itself. That didn't arise simply by reason of the fact that we were going to up the four million acre-feet per annum to 4,230,000 acre-feet.

We were only in a position to guarantee, even with Oroville Dam, about half of the four million acre-feet without additional works.

Chall: Only half; I didn't realize that.

Warne: Unless we could augment the supply. Now, there were several ways the supply could be augmented. We could augment it in part by getting better control in the Delta, which the Peripheral Canal would do. We could augment it by developing some additional waters in the Sacramento Basin itself, such as on Cottonwood Creek, which was one of the proposals.

We even had a dam named Ishi up there. They haven't built it yet, but it's there. Then we could augment it by bringing water in from the Eel River or through the Glenn complex. The Glenn complex was planned at that time and is still planned to capture some additional water in the Stony Creek Basin and also to make it possible to bring more water in from some tributary of the Trinity, or eventually, the Klamath itself. Also, it could be used for off-stream storage to conserve more Sacramento River flood waters.

We had a multitude of plans, some of them far out. Some of them not involved in any way in supplying the necessary roughly two million acre-feet more water that we were going to need by the time the State Water Project got to its full maturity.

Chall: May I just interrupt you a minute? I want to see if I can understand this completely. In 1980, was it, when the initial California Water Plan is supposed to have been completed out of the Burns-Porter Plan?

Warne: Not completed. That was the year the water was all going to be used.

Chall: All going to be used. And is that amount of water only two million some acre-feet, or was it supposed to be four?

Warne: No, that amount of water was 4,230,000 acre-feet.

Chall: And that was supposed to come from...?

Knight / Edmund Brown, Sr., Era: California Water Issues, 1950-1966, William E. Warne, Administration of the Department of Water Resources 1961-66, p. 104.

Warne: About half of it would have to be through augmentation

Chall: From the Feather River? From the Oroville and its conduits?

Warne: No. The Oroville reservoir didn t produce anywhere near that much. The Oroville reservoir and the unallotted waters in the Sacramento Basin only provided about half of the four million. We always intended the law itself says that you're to build additional facilities. The law requires the offset of certain bonds in order to have money to build the additional facilities.

Chall: Yes, I understood that, but I always thought that that was in addition to the four million.

Warne: No. Oh, no. Oh, no. Not in addition to the four million. In addition to the yield of the initial facilities, which provide
about half of the total amount.

Chall: I see.

Warne: So when we went for 230,000 more, we were only increasing fractionally, really, something over ten percent, the additional amount that was going to have to be developed.

Now, mind you, as long as the federal Central Valley Project
Isn't using all of its allotted water, you have the same situation that you had on the Colorado River. Arizona wasn't using all its waters, so someone else could use it in the interim.

Two years after the 1979 interview with Warne, Bulletin 76-81 confirmed Warne's assertion:

Need for Additional Dependable Water Supply
In studies leading to Bulletin 76, it was established that the present dependable water supply (firm yield) of the existing SWP facilities is 2.8 million dam3 (2.3 million ac-ft) per year. By the year 2000, this will decrease to about 2.0 to 2.2 million dam3 (1.6 to 1.8 million ac-ft) per year as a result of increased water use in the areas of origin, maturity of contractual obligations of the federal Central ValleyProject, and other prior rights.[2]

However, as detailed in my historical report, State Water Project Water Supply: Why the State Water Project Cannot Meet Contract Obligations (Exhibit FOR-15)[3], the North Coast Area investigation largely failed, and the promised upstream water supplies for the State Water Project never appeared.

The failure of the State Water Project to provide the full Table A allocations has been blamed on

[2] Exhibit FOR-99, California Department of Water Resources, Bulletin 76-81, Status of Water Supply Augmentation Plans, 1981, p. 6.
[3] FOR-15 is a true and correct copy of the report.

Endangered Species Act protections, but it is really an issue of upstream water supply. The references cited in Exhibit FOR-15 are provided at the end of this testimony.

IV. Changes to Oroville Carryover Storage

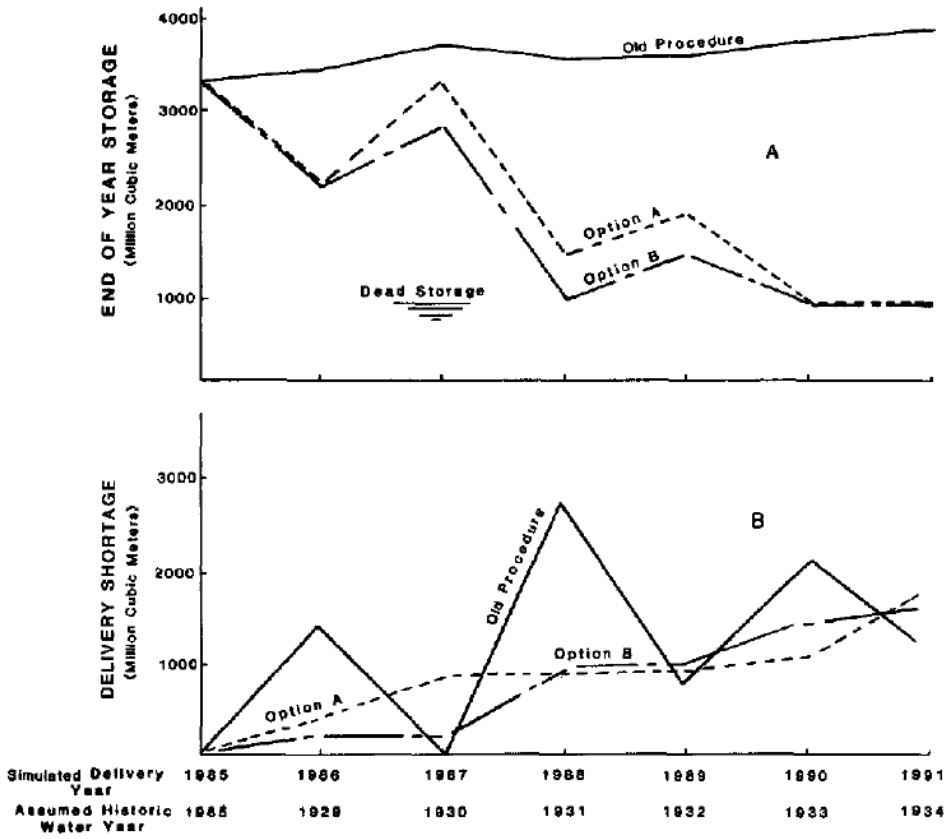
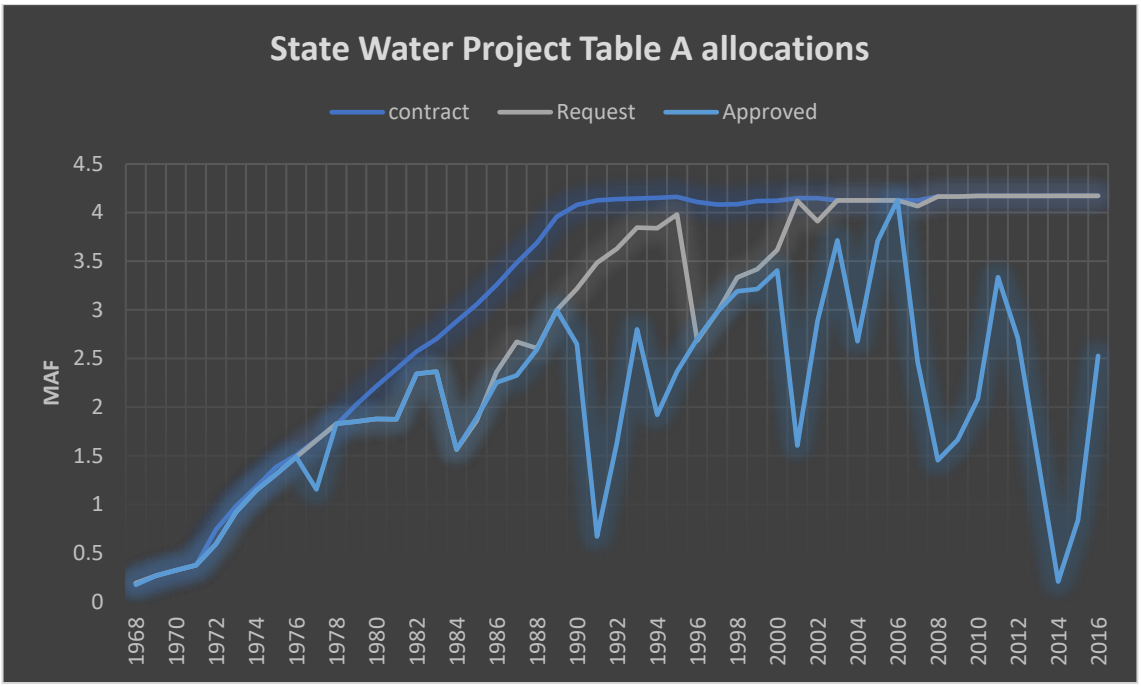


Fig. 5. Simulated SWP operations based on the 1977 rule curve and two alternatives proposed in 1985, for a hypothetical drought beginning with 1985 precipitation and storage conditions, and following the pattern of the 1929–34 design drought: (a) Total project storage at the end of each simulated year; (b) Delivery shortfalls from contract amounts. Source: California Department of Water Resources.

In Part 1 of the WaterFix hearing, I testified about how the 1983 California Water Supply Plan documents that the State Water Project contractors decided to take much larger risks with carryover storage to increase water deliveries, risking draining Oroville reservoir to near minimum pool conditions in a multiyear drought. The report I wrote is submitted as Exhibit FOR-12, and the references are provided at the end of this section. I believe the changes to more aggressively operate Oroville

reservoir is one of the reasons for the large swings in State Water Project deliveries starting in the 1987-92 drought.



There is also an issue of whether the State Water Project is carrying over enough water in Oroville to meet Area of Origin obligations. As detailed in my report, carryover storage criteria has not been disclosed in previous regulatory documents submitted to the State Water Resources Control Board.

Lack of disclosure of the changes in SWP and CVP carryover storage criteria was notable in the 1986 EIR/EIS for the Coordinated Operating Agreement (Exhibit FOR-103)[4], which stated in part,

> Joint commitment of about 2.3 million acre-feet of water supply for Delta outflow during critical water supply periods to meet Exhibit A standards for protection of the environment. This supply is removed from being a potential export source and will provide a benefit by eliminating the direct entrainment of fish at both the Federal and State Delta export facilities that could occur without a commitment to Exhibit A standards. (p. 10)

[4] U.S. Department of Interior, Bureau of Reclamation, Joint Environmental Impact Statement and Environmental Impact Report : Proposed Agreement Between the United States of America and the Department of Water Resources of the State Of California for Coordinated Operation of the Central Valley Project and the State Water Project, 1986. Available at https://archive.org/details/jointenvironment00sacr.

The EIR/EIS also stated

> The amount and timing of in-basin use is not known to or controlled by the project operators and cannot be readily measured, but the Delta is downstream from all other in-basin uses, and compliance with the Exhibit A requirements or "standards" for the Delta can be monitored. If the Exhibit A standards are being met, all other in-basin use requirements are being met, because the Delta gets only the water that remains after upstream uses have been satisfied. (p. 8)

It is unclear, from recent experience in the 2013-2016 drought, whether the 2.3 million acre-feet of project yield committed in 1986 for supply of in-basin use is still being committed for availability during critical periods. For this reason, it is significant that the Coordinated Operating Agreement between the Department of Water Resources and the U.S. Bureau of Reclamation is subject to change in the future under WaterFix operations. I believe the State Water Resources Control Board needs to know of any potential changes in the Coordinated Operating Agreement to fully assess the effects of the proposed change in point of diversion.

It is also unclear that the modeling submitted by the Petitioners for the WaterFix Hearing actually shows the ability to meet Decision 1641 / 2006 Bay-Delta Water Quality Control Plan standards, because of issues with carryover storage and minimum pool in reservoirs. Lack of disclosure of reservoir carryover storage targets was notable in the 2006 plan prepared by the Department of Water Resources to meet Decision 1641 requirements, and submitted to the State Water Resources Control Board as directed by Water Code 138.10:

> On or before January 1, 2006, the director, in collaboration with the Secretary of Interior or his or her designee, shall prepare a plan to meet the existing permit and license conditions for which the department has an obligation, as described in the State Water Resources Control Board Decision No. 1641.

The 2006 plan, entitled, Description of Department of Water Resources Compliance with State Water Resources Control Board Water Right Decision 1641 (Exhibit FOR-104)[5], only discussed past compliance with Decision 1641 requirements, and did not disclose reservoir operations criteria. Without that information, I believe the State Water Resources Control Board cannot assess whether the

[5] Description of Department of Water Resources Compliance with State Water Resources Control Board Water Right Decision 1641, Response to Senate Bill 1155 Enacting California Water Code Section 138.10. Obtained from http://baydeltaoffice.water.ca.gov/announcement/D1641_final.pdf. Accessed on June 12, 2017.

projects do in fact have a plan to meet Decision 1641 requirements in reasonably forseeable drought conditions.

V. Impacts on the Estuary of Over-Allocation: Early Reversal of Delta flows

The permits that were issued to the US Bureau of Reclamation and the Department of Water Resources for direct diversions in the South Delta greatly exceeded natural supplies in the channels of the Delta in many years. The biggest impact of this over-allocation was a more and more extreme reversal of normal Delta outflows.

The graphic on the next page, from the 1970 DFG report on the 1961-64 San Joaquin Chinook crash (Exhibit FOR-110),[6] shows the Delta flows after the Central Valley Project came online but before the State Water Project was completed. The first graphic shows normal flows in the absence of exports by the Bureau of Reclamation. In this case, all of the internal Delta channel flows are towards the ocean. The second graphic shows Old and Middle River flows reversed towards the pumps, and the third shows San Joaquin River flows in the Central Delta reversed, as well as Old and Middle River flows.

The map on the following page shows a closeup of the western Delta. Normally water that flows into the channels of the Delta from the Sacramento River via Georgiana Slough and the Delta Cross Channel, the San Joaquin River, and the Mokelumne River, flows out through Threemile Slough and Jersey Point, joining the lower Sacramento River at Chipps Island.

However, a reversal of normal Delta channel outflows through Threemile Slough and the mouth of the San Joaquin River can occur. The 1970 DFG report described this reversal:

> "The State's 10,000 cfs Italian Slough Pumping Plant near the Tracy plant is now taking a relatively small amount of water. Long before it reaches full operating schedule there will be flow reversal every year and, in most years, it will continue late in the season. Under these conditions, an even more extreme form of flow reversal could occur during the salmon migration period. When the Sacramento River flow is low and the pumps are taking more Sacramento water than will flow through the Delta Cross Channel and Georgiana Slough, the balance must come through Threemile

[6] Hallock, Elwell, and Fry, California Department of Fish and Game, Migrations of Adult King Salmon Oncorhynchus tshawytscha in the San Joaquin Delta as Demonstrated by the Use of Sonic Tags, 1970. Obtained from http://www.escholarship.org/uc/item/9wr0s10v

Slough and by Sacramento [River] water flowing upstream from the mouth of the San Joaquin, thus resulting in a reversal of all flows in the San Joaquin from its mouth upstream to Old River heading."

(underlining added.)

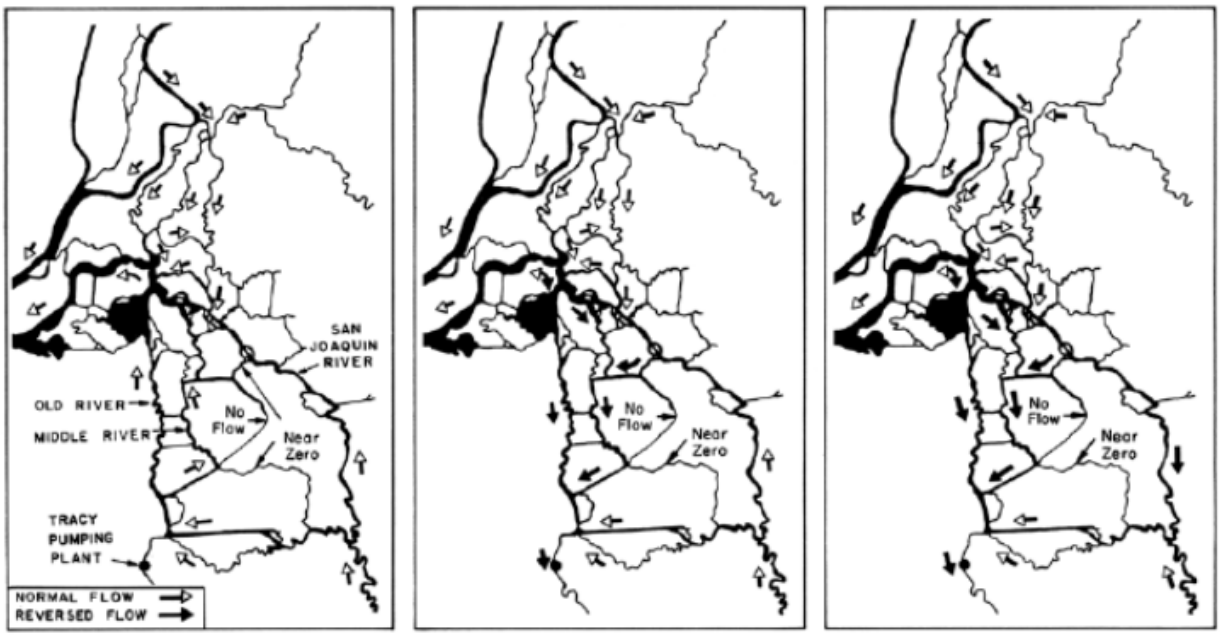


FIGURE 2. Direction of currents in the Sacramento-San Joaquin Delta. Tidal reversals not shown.
LEFT: Normal flows. Tracy Pumping Plant not taking water.
CENTER: With pumping. Old and Middle rivers have reversed, but San Joaquin River still flows normally.
RIGHT: San Joaquin River has reversed.

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VI. Sea Level Rise and Future Demand

A PPIC study by William Fleenor et. al.[7] showed that one foot of sea level rise would require 475,000 af/year of additional outflow to maintain salinity at the western edge of the Delta:

> With one foot of sea level rise, an annual average of 475,000 acre-feet (af) of additional water, provided as additional Sacramento River flows, was required to maintain 1981-2000 salinity conditions at the western edge of the Delta. This volume implies a reduction of more than 10 percent of average export levels in the 1981-2000 period (4.9 million acre-feet (maf) per year). The estimate would be on the low end of future needs under sea level rise because earlier years of the 1981-2000 period were not operated under X2 requirements. With continued sea

[7] Exhibit FOR-111, Fleenor, W, Hanak, E., Lund, J., and Mount, J., 2008. Delta Hydrodynamics and Water Salinity with Future Conditions, PPIC., Technical Appendix C. Obtained from http://www.ppic.org/content/pubs/other/708EHR_appendixC.pdf

level rise, the volume of required outflows would also continue to rise. (p. 18.)

The BDCP/WaterFix modeling obscures this future conflict by only modeling 6 inches of sea level rise. The BDCP/WaterFix modeling also assumes an extra 483,000 af/year of North of Delta demand.[8] This adds up to an extra 958,000 acre feet of future Area of Origin needs of the Sacramento Valley and the Delta. Draining the reservoirs attempting to continue the same level of exports in the face of future conditions would be disastrous. As Ron Stork will testify, increasing diversions to storage will also have severe impacts.

I believe that any public trust or public interest analysis for the WaterFix Change Petition must carefully weigh these potential future impacts.

Executed on this 30th day of November, 2017, in Santa Cruz, California.

Deirdre Des Jardins

[8] Exhibit SWRCB-3, WaterFix Partially Recirculated Draft EIR/ Supplemental Draft EIS, comment RECIRC 2582 SWRCB, p. 2. Available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit3/rdeir_sdeis_comments/RECIRC_2582_SWRCB.pdf

References in reports

State Water Project Water Supply: Why the State Water Project Cannot Meet Contract Obligations

1. Exhibit FOR-92 Bancroft Library, Regional Oral History Office, Governmental History Documentation Project, Goodwin Knight / Edmund Brown, Sr., Era: California Water Issues, 1950-1966, William E. Warne, Administration of the Department of Water Resources 1961-66

2. Exhibit FOR-93 California Department of Water Resources, Bulletin 151-65, Water Progress in California, July 30, 1962- June 30, 1965

3. Exhibit FOR-94 Durham, Dane J., "How the Trinity Lost It's Water"

4. Exhibit FOR-95 California Department of Water Resources, North Coastal Area Investigation, 1964.

5. Exhibit FOR-96 California Department of Water Resources, California Water Plan, 1970.

6. Exhibit FOR-97 California Department of Water Resources, Bulletin 200, California State Water Project v 1. History, Planning, and Early Progress,

7. Exhibit FOR-98 California Department of Water Resources, Bulletin 59-2, Investigation of the Upper Feather River Basin Development, October 1960.

8. Exhibit FOR-99 California Department of Water Resources, State Water Project – Status of Water Conservation and Water Supply Augmentation Plans, November 1981

9. Exhibit FOR-100 California Department of Water Resources, Bulletin 160-87, California Water: Looking to the Future

10. Exhibit FOR-101, State Water Project Notice 99-03

11. Exhibit FOR-102 2013 State Water Project Delivery Reliability Report. Obtained from http://www.water.ca.gov/news/newsreleases/2013/121013drr2013_report.pdf

Failure to Disclose Changes in Reservoir Operations Criteria

12. Exhibit FOR-103 U.S. Department of Interior, Bureau of Reclamation, Joint Environmental Impact Statement and Environmental Impact Report : Proposed Agreement Between the United States of America and the Department of Water Resources of the State Of California for Coordinated Operation of the Central Valley Project and the State Water Project, 1986. Available at https://archive.org/details/jointenvironment00sacr.

13. Exhibit FOR-104 Description of Department of Water Resources Compliance with State Water Resources Control Board Water Right Decision 1641, Response to Senate Bill 1155 Enacting California Water Code Section 138.10. Available at http://baydeltaoffice.water.ca.gov/announcement/D1641_final.pdf. Accessed on June 12, 2017.

14. Exhibit DDJ-209, California Department of Water Resources, Bulletin 160-83, The California Water Plan, Projected Use and Available Water Supplies to 2010. Available from DWR's Water Data Library at http://www.water.ca.gov/waterdatalibrary/docs/historic/Bulletins/Bulletin_160/Bulletin_160-83__1983.pdf. Accessed on June 12, 2017.

15. Exhibit FOR-105, March 2014 comments by Kate Poole for the Natural Resources Defense Council, Pacific Coast Federation of Fishermen's Associations and the Institute for Fisheries Resources, Golden Gate Salmon Association, Defenders of Wildlife, and The Bay Institute. Available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/comments/nrdcetal_poole031714.pdf

16. Exhibit FOR-106, California Sportfishing Protection Alliance, AquAlliance, and California Water Impact Network. Available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/comments/cspa_shutes030314.pdf

17. Exhibit FOR-107, U.S. Bureau of Reclamation, Mid-Pacific Region, M&I Shortage Policy - Central Valley Project, Issue #6: Available at https://www.usbr.gov/mp/cvpia/3404c/mi_shortage/docs/workshop_11-21-00/pos6_allocation_process.pdf.

18. Exhibit FOR-108, U.S. Bureau of Reclamation, Mid-Pacific Region, 1992 Long Term Central Valley Project Operations Criteria and Plan. Available at https://archive.org/details/longtermcentralv00sacr.

19. Exhibit FOR-109 U.S. Bureau of Reclamation, Mid-Pacific Region, November 21, 2000 M&I Shortage Policy workshop, Issue #5: Forecast Procedures https://www.usbr.gov/mp/cvpia/3404c/mi_shortage/docs/workshop_11-21-00/pos5_forecast_predictions.pdf.

I hereby attest that the submitted exhibits are true and correct copies of the above refenced documents.