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**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 THOMAS CANNON

I, Thomas Cannon, do hereby declare:

Intro and bio:

My name is Thomas Cannon. I am a retired environmental consultant and have worked on many issues related to Central Valley water projects over the past 40 years. I have consulted with Reclamation, DWR, DFW, USACE, SWRCB, USFWS, NMFS, State and Federal water contractors, and many other state and local government and non-government organizations on Central Valley environmental issues. I was a resource analyst consultant on the CVPIA and CALFED programs, working on detailed operations reviews of the SWP and CVP. I am very familiar with all operating aspects of Central Valley water projects and their role in hydrology, water quality, and ecosystem functions. My educational and experience background has been

focused on data analysis and statistics, fishery biology and population dynamics, freshwater and estuarine ecology, and environmental impact assessment.

Summary Statement

The case for the WaterFix is founded on the assumption that CVP and SWP compliance with water quality standards and biological opinions 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 standard requirements will remain in place because requirements have not protected 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 (BO) by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, in the update of the Bay-Delta Water Quality Control Plan, and/or in other regulatory actions.

Another purpose of my testimony is to show that many standards have not been complied with, chief among which are the water temperature objectives for the Sacramento River in the Basin Plan and in Water Rights Orders pertaining to the CVP. Reclamation has often not met these requirements. Reclamation's ability to meet these requirements while also meeting all in-Basin uses in the future is highly unlikely. Stress on the combined operation of the CVP and SWP due to constraints on the Shasta-Trinity Division of the SWP will increase demands on other divisions of the CVP and on the SWP, reducing their ability to meet in-Basin uses.

Statement on CVP/SWP operations:

The purpose of my testimony is to discuss some of the key issues related to the operations of the CVP/SWP on hydrology and water quality that affect many of the beneficial uses of water in the Central Valley, Delta, and Bay. I offer my insights into the potential effects on beneficial uses

that may be further modified by the proposed WaterFix. The WaterFix will provide significant infrastructure and system capability to modify CVP/SWP operations effects on the Central Valley as well as the adjacent Klamath River and San Francisco Bay-Delta ecosystems and beneficial uses. The WaterFix has the potential to significantly alter system reservoir storage, reservoir releases and river flows, Delta inflow and outflow, which in turn would potentially affect water supply and quality. Such effects would directly and indirectly effect beneficial uses.

Statement on Shasta-Trinity Division of CVP:

The water resources of the Shasta-Trinity Division of the CVP are a primary component of the Central Valley ecosystem and water supply. Shasta and Trinity reservoirs are the key elements of water supply infrastructure of the CVP. Over the past decade the water supply of both reservoirs has suffered measurably¹ from drought (lack of rain and snow), high water supply demands, and new fish requirements (flow and coldwater pool use and conservation). New operational constraints are expected in the coming years from new biological opinions for the Klamath-Trinity Coho and Sacramento Winter Run Chinook salmon. The National Marine Fisheries Service (NMFS) is in the process of conducting a separate consultation on the effects of the Shasta-Trinity Division operations on listed Coho salmon in the Trinity River. The NMFS LTOBO for the long-term operation of the CVP and SWP (LTO BO) will be analyzed in the Trinity Coho Opinion, and the LTO BO may be adjusted as necessary to avoid jeopardy to Trinity-Klamath Coho salmon and adverse modification of their critical habitat. A new LTOLTO 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

¹ See Exhibit CSPA-46, Figures 1-2.

available from Trinity and Shasta Reservoirs. Water supply releases from Shasta will be further constrained by the need to sustain the cold-water pool in the reservoir. The ability of the CVP to meet Sacramento River contractor demands will remain uncertain. The ability to meet CVP water demands in the Delta as well as flow requirements for water temperature in the lower Sacramento River (e.g., Basin Plan water quality objectives²) and Delta outflow is questionable. The potential adverse effects of reduced Shasta-Trinity water supply on salmon and sturgeon are significant. The future ability of the Shasta-Trinity Division to meet water supply demands of the WaterFix is therefore in question. It is not clear how these future constraints on projected water supply yields of the WaterFix are taken into account, or whether WaterFix demands will affect demands on the Shasta-Trinity water supply or its delivery schedule and commitments to water contractors. It is clear that more of the Shasta-Trinity water resources will be dedicated toward water quality and endangered salmon, steelhead, and sturgeon.

Statement on the Oroville Division of SWP and Folsom Division of CVP:

With significant reduction in the 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. Like Shasta and Trinity, Oroville³ and Folsom⁴ water supplies have suffered in the past decade. Folsom demands have resulted in extreme low winter flows and high summer water temperatures (loss of cold water pool)⁵. WaterFix demands may aggravate the already compromised Oroville and Folsom water supplies. Projected WaterFix water supply benefits from these reservoirs are

² See Exhibit CSPA-46, Figure 3.

³ See Exhibits CSPA-46, Figure 4.

⁴ See Exhibits CSPA-46, Figure 5.

⁵ See Exhibit CSPA-46, Figure 6.

likely overestimated. Further constraints on the Feather and American reservoirs are likely from a new LTO BO. The potential effects on beneficial uses in these two rivers from the WaterFix are likely underestimated.

Statement on Delta operations of the CVP/SWP:

Existing operations in dry years have resulted in low flows and high water temperatures in the lower Sacramento River in the area of the proposed Tunnel intakes⁶ and further downstream at the Rio Vista Bridge⁷. Proposed lower net flows below the WaterFix intakes will increase the frequency of high water temperatures in the north Delta channel of the Sacramento River. Future adjustments to D-1641 and LTO BO related to these effects will likely affect projected water supply benefits of the WaterFix.

In wetter years (water years 2006 and 2011), and dry years with high carryover storage (2007 and 2012), there is another problem with the WaterFix. Water can be released from reservoirs for Delta export or transfers with no restraints. As long as bypass and water quality standard requirements are met, 100% of the new water can be taken by WaterFix. The tunnel diversions as proposed would not be limited by export/inflow ratios as South Delta exports are, only by bypass requirements. There are no proposed limits on how far project reservoirs can be drawn down. The 20,000 cfs Freeport flow in the summer of the wetter years⁸ can be increased as much as necessary to max out tunnel diversions. After June, total exports can be 15,000 cfs as compared to the present limit of 11,400 cfs, as long as Delta salinity standards are met. There are only nominal bypass requirements from July-November. After mid-August the only restraints on the

⁶ See Exhibits CSPA-46, Figure 7.

⁷ See Exhibits CSPA-46, Figure 8.

⁸ See Exhibit CSPA-46, Figure 9.

tunnels are the minimum D-1641 Delta outflow of 4000 cfs, a south Delta salinity standard of 1 mmho, and a 65% D-1641 Export/Inflow on south Delta exports. In wetter years with plenty of water, south Delta exports are usually maximum (11,400 cfs) under these rules. With the tunnels, the maximum combined diversion is 15,000 cfs, with 9000 cfs from tunnels that have no E/I constraint. Under these conditions, flows into the central and south Delta via Georgiana Slough and the Delta Cross Channel would be less than under present conditions.

Statement on Delta outflow to the Bay:

Although minimum Delta outflows to the Bay are not expected to change because of minimum water quality standards, outflow during drier years (over 50% of water years) from uncontrolled runoff flows of lower Sacramento tributaries⁹ will be reduced measurably by the WaterFix Tunnel capacity. This capacity does not exist today with present infrastructure and current operational constraints. 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 potential effect on winter-spring outflow to the Bay is substantial with respect to many Bay beneficial uses.

Looking more closely at Delta inflow at Freeport over the past five dry years (2012-2016), one can envision how the WaterFix tunnels even with bypass rules from Dec-Jun could chop off a substantial portion of winter-spring uncontrolled flow pulses. One often hears that water is being wasted to the Bay and could be diverted. But it is important to remember this is an estuary. In these drier years, 80% or more of Valley rain and snowmelt into Valley reservoirs is stored for summer use. Most of the remaining 20% that reaches the Bay comes in with winter rain-

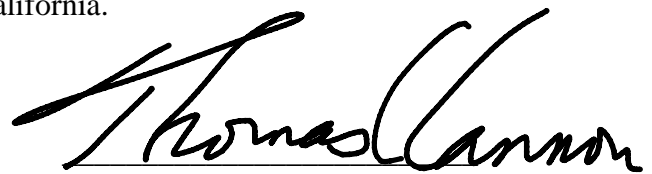
⁹ See Exhibit CSPA-46, Figure 10.

snowmelt pulses from Valley streams that have no reservoirs. The runoff from the uncontrolled sources in winter pulses can make up half of the annual outflow to the Bay. Today about two-thirds reaches the Bay because of winter-spring BO export restrictions. The WaterFix will reduce that commitment to the Bay to less than half – outflow to the Bay will fall below 50% of the Valley’s annual water supply. The State Board’s own assessment found that a healthy estuary needs at least 75% of its water. Outflow would be only about 40% with the WaterFix in over half of future water years. DWR’s own testimony shows that in one of the wetter dry years, 2016, the WaterFix would allow taking over 25% of the “excess outflow” to the Bay.

Statement of Conclusion

In conclusion, the above-described effects of the WaterFix would have multiyear consequences to all beneficial uses in the Central Valley and Bay-Delta. The effects will be widespread and significant involving all aspects of the Valley-Bay-Delta ecosystem, including water supply and water quality.

Executed this 31st day of August, 2016 at Fair Oaks, California.



Thomas Cannon