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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 CHRIS SHUTES ON PART 2 ISSUES: EFFECTS ON FISH AND WILDLIFE PUBLIC TRUST PUBLIC INTEREST

I, Chris Shutes, do hereby declare:

I. INTRODUCTION

My name is Chris Shutes. I work as a consultant to the California Sportfishing Protection Alliance (CSPA). My titles with CSPA are FERC Projects Director and Water Rights Advocate. I have worked on hydropower and water rights issues for CSPA since 2006. Prior to beginning my work as a consultant to CSPA, I worked as a volunteer on the relicensing of three hydropower projects in the American River watershed over the course of five years. Primarily through my hydropower work, I have developed expertise in interpreting the output of water balance models and in analyzing the interrelation of reservoir storage, instream flow, hydropower production and consumptive water use. In my water rights work for CSPA, I have provided written and oral testimony in three hearings before the State Water Resources Control Board (Board) relating to water rights applications, including the 2008 hearing on the revocation of the Bureau of Reclamation's permits for Auburn Dam. I have also provided oral and written

comments in multiple Board workshops and board meetings. In 2014, 2015 and 2016, I drafted many of CSPA's protests, objections and petitions for reconsideration of Temporary Urgency Change Petitions filed by the Department of Water Resources (DWR) and the Bureau of Reclamation (Bureau) in response to hydrological conditions created by drought and by the operation of the State Water Project (SWP) and Central Valley Project (CVP). My statement of qualifications lists many of the hydropower projects on which I have worked and my experience before the Board; it also provides more detail regarding work experience relevant to my testimony.

My testimony will primarily focus on Key Issues 3(c) and 3(d) for this hearing, which ask:

> ***Key Issue 3(c) If so for a and/or b above, what specific conditions, if any, should the State Water Board include in any approval of the Petition to avoid unreasonable effects to fish, wildlife, or recreational uses?***
>
> ***Key Issue 3(d): What Delta flow criteria are appropriate and should be included in any approval of the petition, taking into consideration the 2010 Delta flow criteria report, competing beneficial uses of water, and the relative responsibility of the Projects and other water right holders for meeting water quality objectives?***

My testimony will describe the necessary scope of the conditions that the Board would need to place on SWP and CVP permits to avoid unreasonable effects to fish and wildlife. This scope is broad. The scope of conditions must be broad because of the particular breadth and effect of the SWP and the CVP. The scope of conditions must be broad because of the operation of all the parts of these Projects in an integrated and coordinated fashion. The scope of conditions must be broad because of the specific mandates of the Water Code § 85086 (Delta Reform Act of 2009). In considering conditions to place on the permits for the SWP and CVP in this proceeding, the Board can and must evaluate conditions for all aspects of SWP and CVP operation, not just those immediately related to the new points of diversion.

In some cases, I will make specific recommendations to answer Key Issues 3(c) and 3(d). In other cases, I will defer to specific recommendations responsive to Key Issues 3(c) and 3(d)

made by other witnesses in this proceeding, particularly the recommendations of CSPA witnesses Tom Cannon and Bill Jennings (CSPA-204 and CSPA-200). In still other cases, I will describe specific aspects of how the Board should go about analyzing and setting specific permit terms. Dr. Whitelaw, Mr. Del Piero and other witnesses for CSPA et al. will describe more generally the process the Board should use to balance beneficial uses.

In response to the "relative responsibility of other water rights holders" that is raised at the end of Key Issue 3(d), the Board must not be broad. The Board is limited in this hearing to conditions it can place on DWR and the Bureau in the operation of the SWP and the CVP. The Board cannot ask others to mitigate the effects of the operation of the SWP and the CVP. The Board cannot assume future actions by others that might have the effect of achieving such mitigation.

The Board must limit the use of adaptive management, some form of which is required in Water Code§ 85086. The Board should reject the excessively open-ended use of adaptive management that DWR and the Bureau propose in this proceeding. Equally, the Board cannot protect fish and wildlife from unreasonable effects by relying on the excessively open-ended use of adaptive management that the fisheries agencies have described in their Biological Opinions (SWRCB-105 and SWRCB-106) and Incidental Take Permit (SWRCB-107).

My testimony will make some responses to Key Issues 3(a) and 3(b), which read:

Key Issue 3(a): Will the proposed changes in points of diversion alter water flows in a manner that unreasonably affects fish, wildlife, or recreational uses of water?

Key Issue 3(b): Will the proposed changes in points of diversion alter water quality in a manner that unreasonably affects fish, wildlife, or recreational uses of water?

Specifically, I will refer to my testimony in Part 1 of this hearing that analyzed how reservoir operations under the California WaterFix would injure legal users of water. Many of the same issues I raised in Part 1 regarding reservoir operations would also cause unreasonable effects to fish and wildlife. Without repeating my Part 1 testimony, I will point out some of these unreasonable effects that are germane to Part 2.

In addition, I provide examples of how "adaptive management" in the drought of 2014 and 2015 caused unreasonable effects to fish and wildlife. I describe how the open-ended use of adaptive management during 2014-2015 had devastating impacts to both pelagic and anadromous fisheries. This provides part of the basis for my recommendations on limiting the reliance on adaptive management in permit conditions.

The last section of my testimony will address Key Issue 4, which reads:

Key Issue 4: Are the proposed changes requested in the petition in the public interest? What specific conditions, if any, should be included in any approval of the Petition to ensure that the changes are in the public interest?

My testimony will describe how deferring protections for fish and wildlife to future process or decisions is not in the public interest. If it approves the WaterFix petitions, the Board must set permit terms now that protect fish and wildlife.

II. THE BOARD SHOULD GIVE GREAT WEIGHT TO THE SUBMITTALS OF THE FISHERIES AGENCIES IN THE 2010 INFORMATIONAL DELTA FLOW CRITERIA PROCEEDING TO DETERMINE APPROPRIATE DELTA FLOW CRITERIA FOR THE WATERFIX PETITIONS.

Water Code § 85086(c)(2) (part of the Delta Reform Act of 2009) mandated: "Any order approving a change in the point of diversion of the State Water Project or the federal Central Valley Project from the southern Delta to a point on the Sacramento River shall include appropriate Delta flow criteria and shall be informed by the analysis conducted pursuant to this section."

Water Code § 85086(c)(1) mandated: "For the purpose of informing planning decisions for the Delta Plan and the Bay Delta Conservation Plan, the board shall, pursuant to its public trust obligations, develop new flow criteria for the Delta ecosystem necessary to protect public trust resources." The Board conducted an "informational" proceeding to develop "new flow criteria" pursuant to § 85086(c)(1), and in August 2010 produced and approved the document entitled "*Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem,*

Prepared Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009," (hereinafter, *2010 Delta Flow Criteria Report,* SWRCB-25*).* The *Delta Flow Criteria Report* stated on page 2: "The best available science suggests that current flows are insufficient to protect public trust resources." On page 5, it stated: "Recent Delta flows are insufficient to support native Delta fishes for today's habitats."

The fisheries agencies conducted analyses in the 2010 Delta flow criteria informational proceeding. In its summary filing for the proceeding, the U.S. Fish and Wildlife Service (USFWS) stated (in a joint Department of the Interior filing with the Bureau): "In general, the scientific information indicates that the current minimum Delta flow criteria are not adequate to protect the aquatic resources and restore the Delta ecosystem." (CSPA-300, p. 11). The California Department of Fish and Game (now California Department of Fish and Wildlife, CDFW) was required under §85084.5 of the Delta Reform Act to produce and deliver to the Board flow criteria and quantifiable objectives for Delta fisheries. In response, CDFW produced and released in 2010 "*Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta*." (SWRCB-66). This CDFW 2010 document stated on p. 4: "Fish population declines coupled with these hydrologic and physical changes suggest that current Delta water flows for environmental resources are not adequate to maintain, recover, or restore the functions and processes that support native Delta fish." (SWRCB-66, p.4).

Similarly, numerous experts from the NGO and academic communities concluded that existing flows in the Delta were insufficient to protect public trust resources.

Yet the ***only*** proposal for Delta flow requirements and constraints that DWR and the Bureau propose in their September 8, 2017 "Response to the Hearing Officers' August 31, 2017 Ruling," *(Petitioners' September 8 Response,* Exhibit CSPA-256), are requirements and constraints that exist today. On the broadest level, DWR and the Bureau effectively propose that the Board ***completely ignore*** the analysis from the 2010 informational Delta flow criteria proceeding.

A. Role of Fisheries Agencies in This Hearing

In my experience with water rights applications and petitions, the California Department of Fish and Wildlife (CDFW) is almost invariably a protestant in such proceedings. As part of protest resolution, or in hearing, CDFW recommends specific protection, mitigation and enhancement measures, including instream flows and in some cases reservoir operations, as well as measures related to terrestrial resources, under its explicitly stated responsibility as the state's trustee agency for fish and wildlife resources. These recommendations are separate and distinct from any of CDFW's responsibilities under CESA. In the same regard, the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are sometimes protestants in water rights proceedings, and recommend protest dismissal terms separate from their ESA authorities.

When fisheries agencies are protestants in water rights proceedings, their status as protestants does not necessarily mean that they completely oppose the subject water rights applications or petitions. Often times, the purpose of protests is to ensure appropriate permit terms to protect fishery and other public trust resources.

The fisheries agencies are conspicuously absent from these hearings. This absence is reminiscent of their absence before the Board at the end of January/beginning of February 2015. At that time, the fisheries agencies limited their responses to DWR and the Bureau's proposed Temporary Urgency Change Petitions: the fisheries agencies offered only ESA and CESA approval. In a display of remarkable candor, State Water Board Executive Director Tom Howard stated bluntly on the February 3, 2015 that the fisheries agencies had failed to answer the fundamental legal question posed to them in the Temporary Urgency Change Petitions filed by DWR and the Bureau on (date). In the *"Order Approving in Part and Denying in Part a Petition for Temporary Urgency Changes to License and Permit Terms and Conditions Requiring Compliance with Delta Water Quality Objectives in Response to Drought Conditions"* ("February 3, 2015 TUCP Order", CSPA-301), Mr. Howard stated:

> It should be noted that while the fisheries agencies indicated that the changes proposed in the TUCP could be made in compliance with ESA and CESA requirements, those letters

> did not determine whether the potential impacts of the changes would unreasonably affect fish and wildlife. The ESA and CESA standard of avoiding jeopardy to the continued existence of a threatened or endangered species is a minimal standard, and as such may differ from the Water Code requirement that the changes must not unreasonably affect fish and wildlife, especially when many species have already experienced extreme impacts from the drought for several years. (CSPA-301, p. 17)

CDFW, USFWS and NMFS have chosen to repeat this error in the present proceeding. They have limited their responses to those that address ESA and CESA requirements. Unless the Hearing Officers require them to appear under subpoena or similar legal instrument, CDFW, USFWS and NMFS will not appear in this proceeding and will not be subject to cross-examination. They will not be present to evaluate whether the requested change in the point of diversion would have unreasonable impacts to fish and wildlife. They will not propose permit terms that would avoid such effects. They will not offer their opinions on the "appropriate Delta flow criteria" that are required in this hearing under Water Code § 85086(c)(2).

Because of their absence of from this hearing, it becomes essential to review what CDFW, USFWS and NMFS have already said. Their analyses in the 2010 informational Delta flow criteria proceeding required under Water Code § 85086(c)(1) take on particular importance.

B. Analysis and recommendations by the fisheries agencies in the 2010 Delta flow criteria informational proceeding

The submittals of the fisheries agencies and all the other contributors to the 2010 Delta flow criteria informational proceeding are available on the Board's webpage at the following url or at a url linked there:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/entity_index.shtml

Exhibit CSPA-300 is the written submittal of the Department of the Interior to the 2010 Delta flow criteria informational proceeding. Exhibit CSPA-302 contains excerpts from Exhibit 300. Exhibit CSPA-303 is the written summary submittal of the National Marine Fisheries Service to the 2010 Delta flow criteria informational proceeding. Exhibit CSPA-304 is a copy of NMFS Exhibit 7 from the 2010 Delta flow criteria informational proceeding entitled:

Residence of Winter-Run Chinook Salmon in the Sacramento-San Joaquin Delta: The role of Sacramento River hydrology in driving juvenile abundance and migration patterns in the Delta. Exhibit CSPA-305 reproduces the first two pages of NMFS Exhibit 9 from the 2010 Delta flow criteria informational proceeding: page 2 includes recommendations for flows to protect sturgeon. In the original, NMFS followed pages 1 and 2 with the entire 544-page *Working Paper on Restoration Needs* published by the Anadromous Fish Restoration Program in 1995. Exhibit CSPA-306 contains the summary tables of flows recommended by the California Department of Fish and Game (now Wildlife) in its November 2010 Report entitled *Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta*. The complete document is Exhibit SWRCB-66.

All of these documents contain extensive analysis and recommendations that have merit. I summarize some of the findings below, referring to the excerpts in CSPA summary exhibits for focus and ease of reference; the CSPA summary exhibits contain citations to page numbers in the original documents. I also suggest where the agency analysis is particularly relevant for the WaterFix petitions.

USFWS emphasizes the importance of outflow in maintaining the Low Salinity Zone (X2) in Suisun Bay to promote phytoplankton productivity, to support fish rearing, and to reduce entrainment into the south Delta pumps. (CSPA-302, Slide 3).

USFWS discusses the importance of keeping fish out of the "footprint of the exports," and points out that in only a "few tidal cycles" fish can enter this footprint. (CSPA-302, Slide 4). This is particularly important if the operation under WaterFix whipsaws exports to the south Delta when the SWP and CVP are forced to reduce or limit North Delta Diversions. Ramping rates for south Delta export increases will be important, as well as limiting south Delta exports in general.

USFWS points out that San Joaquin River flows at Vernalis flows are of limited value in protecting San Joaquin River fisheries if those flows are directed toward the south Delta pumps. (CSPA-302, Slide 5). USFWS also points out the dramatic effect of reverse flows on Delta smelt and other pelagic species (CSPA-302, Slide 6). More positively, USFWS describes the

importance of maintaining positive (westward) flow at Jersey Point ("QWEST") on the San Joaquin River. This requirement was part of draft Decision 1630 (CSPA-302, Slides 7 and 8).

Restrictions on exports and the importance of passing inflow from the San Joaquin through to Suisun Bay remain highly relevant for WaterFix. DWR and the Bureau plan to continue to operate the south Delta export facilities in conjunction with the new North Delta Diversion. In spite of the branding that WaterFix will improve conditions for fish, there is no operations plan that describes how DWR and the Bureau will actively manage the SWP and CVP to achieve that purpose. On the contrary, the general approach in this proceeding has been to recommend limited constraints on both north Delta and south Delta operations. The Board must require permit conditions that protect fish from harm at the south Delta export facilities, whatever the SWP and CVP's operation of those facilities may eventually be.

USFWS points to the importance of maintaining flow at Rio Vista at levels of 20,000 to 30,000 cfs to protect outmigrating salmon. (CSPA-302, Slide 9). This flow range, which dates back to studies by Brandes and Kjelson in the 1980's, is a consistent theme among the fisheries agencies. The use of Rio Vista as a point of measurement is also consistent throughout agency submittals in the 2010 Delta flow informational proceeding. To the degree that I understand it, I believe that DWR and the Bureau propose to do away with Rio Vista as a flow compliance point. Rio Vista picks up downstream flow that makes it past the Delta Cross Channel and the mouth of Georgiana Slough. It is a highly relevant and important compliance point, and the Board should maintain Rio Vista as a compliance point in permit terms.

In its 2010 summary submittal for the Delta flow criteria informational proceeding, NMFS calls out the fact that prescriptions under the Endangered Species Act are less than what is required for "protection of public trust resources." (CSPA-306, Slide 3).

NMFS calls particular attention to the importance of avoiding "reverse flows" on the Sacramento River at the mouth of Georgiana Slough during "the salmon migrating period," so that salmon outmigrants do not enter the Central Delta (CSPA-306, Slide 4). This principle clearly applies to the proposed North Delta Diversions under CA WaterFix. Reverse flows created by operation of the North Delta Diversions may create reverse flows at the mouth of

Georgiana Slough. In addition, reverse or reduced flows will increase transit time past the North Delta intakes. See also CSPA-400 and CSPA-401 for the effects of extended transit times past the screens at the North Delta Diversions.

In its 2010 summary, NMFS devotes extensive attention to storage requirements in Shasta Reservoir to protect water temperatures in the Sacramento River. (CSPA-306, Slides 5, 6 and 7). NMFS explicitly connects these requirements to Delta flow criteria and to the Bay Delta Conservation Plan, forerunner of the California WaterFix. CSPA recommends that the Board incorporate the end-of-September carryover storage targets shown on CSPA-306 Slide 7 as a condition in the CVP's permits, as I discuss further below. It is likely that the end-of-April targets shown on CSPA-306 Slide 6 would not allow sufficient releases from Shasta to support Delta outflow in the spring; this requires further analysis.

In NMFS's 2010 Exhibit 7 submittal, NMFS states: "[H]igher volume of water flowing in the river during the winter run emigration period results in greater abundance of winter run smolts both entering the Delta at Knights Landing and subsequently exiting the Delta at Chipps Island." (CSPA-306 Slide 8). This relationship is later developed in del Rosario, R. B. et al. 2013. *Migration Patterns of Juvenile Winter-Run-Sized Chinook Salmon(Oncorhynchus tshawytscha) through the Sacramento–San Joaquin Delta* (CSPA-308). Del Rosario et al. (2013) is the basis for much of the analysis in the NMFS Biological Opinion for WaterFix (SWRCB-106); this document also discusses the relation between flow pulses and outmigration and extended rearing time of winter-run in the Delta.

Del Rosario et al. find that "Winter-run passed Knights Landing (rkm 144 or 51 rkm upstream of the Delta) between October and April, with substantial variation in peak time of entry that was strongly associated with the first high flows of the migration season." (CSPA-308, p. 2). Additional spikes in migration correspond to subsequent flow pulses. It is highly likely that many of the relationships and patterns del Rosario et al. describe for winter-run also hold for other runs of Sacramento River salmon. Winter-run Chinook provide opportunities for observation and study that are unique because their early development and consequent larger size relative to other runs of Chinook makes them relatively readily identifiable. In study,

winter-run thus eliminate multiple confounding factors that frustrate study of other runs of Central Valley Chinook. For runs of juvenile Chinook that pass Freeport and rear in the Delta later in the year than winter-run, it is difficult to determine when they arrived and how long they have reared in the Delta. Although other runs of Chinook are harder to study and analyze with a similar level of certainty, this does not mean that the same migration patterns and rearing behavior in the Delta does not hold for them. They too likely migrate downstream on major flow pulses. Many of them also rear for months in the Delta.

The Biological Opinion for WaterFix evaluates greatly reduced use of the North Delta Diversions based on "Pulse Protection" when "winter-run-sized" or "spring-run-sized" fish are detected in rotary screw traps at Knights Landing, although the BiOp stops short of requiring even this minimal measure. (See analysis in SWRCB-106, Appendix E). The pulse in this case refers to pulses of fish, not to flow pulses. There are multiple problems with this approach. First, it would allow operations that are more likely to entrain, impinge or otherwise place fish at risk if no target species or minimal numbers of those species are present. Other runs of salmon or other species would be compelled to run the north Delta gauntlet at lower, riskier flow levels. Second, it depends on detection, which is unreliable. Smolt sized salmon, for instance, are often capable of swimming out of rotary screw traps. Third, it does not account for pelagic fish that are too small to detect, such as larval smelt or larval stages of other species.

NMFS's 2010 Exhibit 9 submittal recommends flows to protect sturgeon. NMFS recommends Delta outflow at Chipps Island in in April and May of Above Normal and Wet years that average 25,000 cfs to protect sturgeon (CSPA-306, Slide 9), and flows of 31,000 cfs at Verona on the Sacramento River from February through May of Above Normal and Wet years (CSPA-306, Slide 10).

CDFW summarizes its recommendation in a flow table on pages 105-107 of its November 2010 *Quantifiable Biological Objectives and Flow Criteria* document, reproduced in Slides 3-5 of CSPA-308. The areas of focus and flow numbers are generally consistent with those of USFWS and NMFS. CDFW recommends 20,000 – 30,000 cfs at Rio Vista in April, May and June to protect outmigrating fall-run salmon. CDFW calls for positive flows at Jersey

Point from November through June "when salmon are in the Delta." While CDFW's proposed means of determining whether salmon are present is unclear, the fact that there are risk factors at lower flows is clear. DFW recommends various additional limitations in different months and at different levels for reverse flows in Old and Middle rivers to protect a variety of species.

III. THE WATERFIX PERMITS IF GRANTED MUST CONDITION OPERATIONS OF SWP AND CVP RESERVOIRS WITH FIRM CARRYOVER STORATE REQUIREMENTS.

"Appropriate Delta flow criteria" (Key Issue 3(d)) cannot be separated from reservoir operations. If the Board were to approve the WaterFix petitions with flow criteria that did not also appropriately constrain reservoir operations, then DWR and Bureau operators could make up all or part of any required Delta flow increases with storage withdrawals from their reservoirs. This would redirect fisheries impacts upstream to the river reaches downstream of any or all of the main SWP and CVP Central Valley storage reservoirs.

In order to assure that the construction and operation of WaterFix does not cause DWR and the Bureau to unreasonably draw down their storage reservoirs, the Board should condition the SWP and CVP permits to require responsible carryover storage amounts in SWP and CVP reservoirs. The Board should also require additional condition the permits on additional operational measures that I describe below. This will help to prevent unreasonable impacts to fish and wildlife in addition to preventing injury to other legal users of water.

It is important that the Board develop and enforce carryover storage requirements for each of the major north-of-Delta SWP and CVP storage reservoirs. Without requirements at each reservoir, requirements at one or more of these reservoirs will redirect impacts to those that have no requirements. The requirements for the reservoirs must be balanced in light of the integrated operation of the SWP and the CVP.

Witnesses for DWR and the Bureau testified in Part 1 of this hearing that there are no numeric carryover storage requirements for Trinity, Oroville and Folsom reservoirs, and that they oppose imposition of such numeric requirements [cite]. There are numeric requirements in

the Biological Opinion (BiOp) for the long term-operation of the SWP and CVP for Shasta Reservoir operation, but these requirements contain exceptions and are dependent on the continued existence and the enforcement of those BiOps.

Mr. Milligan testified that there is a "principle" that governs how the Bureau manages storage in Folsom Reservoir [cite]. Mr. Leahigh testified that a "policy" governs DWR's management of storage in Oroville Reservoir [cite]. I do not recall any witnesses testifying to storage management in Trinity Reservoir, and I am unaware of any firm requirement for carryover storage in Trinity Reservoir. I discuss potential carryover storage requirements and other operational issues for each of these reservoirs below.

A. Reliance on Biological Opinions does not assure that operation of Shasta Reservoir will not have unreasonable effects on Fish and Wildlife.

At the most basic level, Biological Opinions are not necessarily durable.

Some of the species BiOps are designed to protect, such as Sacramento winter-run Chinook salmon, may go extinct. Combined with their exceptionally low abundance, stochastic management decisions or natural events could finish some species off. While it is generally recognized that other species often benefit from prescriptions in BiOps, the loss of target species would eliminate these protections.

Further, the agencies that issue and enforce BiOps are subject to both short term and long-term political pressure. I provided examples in my testimony in Part 1, citing to exhibit CSPA-39. The Endangered Species Act itself has also been subject to numerous legislative attempts to weaken it if not outright repeal it.

More specifically, the protective reach of the Endangered Species Act is limited.

In the "NMFS Written Summary *Submitted 2.16.2010 for the Delta Flow Criteria Proceeding,*" (Exhibit CSPA-303), the National Marine Fisheries Service stated:

> It is important to note that the flow protections described in the project description and RPA are the minimum flows necessary to avoid jeopardy. The Delta flow criteria necessary to "protect public trust resources" may not be the same as those called for in the NMFS Opinion, and will likely be greater than those described in the opinion. In addition, NMFS considered provision of water to senior water rights holders to be non-

> discretionary for purposes of the federal ESA as it applies to Section 7 consultation with the Bureau of Reclamation. This constrained development of RPA Shasta storage actions and flow schedules. This constraint may not apply to the SWRCB flow criteria process. (CSPA-302, pp. 3-4).

As this NMFS document describes, the legal standard for jeopardy is different from the legal standard "to protect public trust resources." Neither in 2010 nor in the present WaterFix hearing has NMFS opined on what Shasta storage requirements are necessary to protect public trust resources. In addition, the requirements in the Biological Opinion do not protect non-listed species like fall-run Chinook salmon in the Sacramento River downstream of Shasta and Keswick reservoirs.

A specific example of how BiOp protections do not protect non-listed species is shown in exhibits CSPA-310 and CSPA-311. At the beginning of November 2017, the Bureau of Reclamation reduced releases from Keswick Reservoir. As shown in CSPA-310, this dropped the stage height in the Sacramento River 2 feet at the gauge downstream of Keswick and by more than a foot at Bend Bridge. Sacramento River fall-run Chinook prefer spawning in 1 to 2 foot depths (CSPA-311). In addition, water temperatures in the Sacramento River from September 22 – November 22 averaged around 53° near Redding and 54° downstream near Bend Bridge (CSPA-312). These temperatures are well within the thermal spawning preferences of fall-run Chinook salmon, and the month of October is well within the spawning window for fall-run Chinook salmon. (SWRCB-66, p. 51). Thus, the November 1, 2017 drop in Sacramento River stage height likely dewatered a substantial number of the fall-run redds that spawning fish had created before that date.

Had fall-run been a listed species, it is likely NMFS would have disallowed this drop in stage height as non-compliant with the ESA protections. It is also likely that CDFW would have found this action to be non-compliant with CESA. However, neither prevented this action on public trust grounds to protect fall-run Chinook.

This incident has both general and specific applicability. The general lesson is that biological opinions do not protect non-listed species, including the fall-run Chinook salmon that are the backbone of California's commercial and sport salmon fishery. The specific lesson is

that in the absence of constraints, both the fisheries agencies and CVP operators chose not to protect Sacramento River fall-run Chinook redds in the water on November 1 in one of the wettest water years on record.

In my testimony in Part 1 of this proceeding, I described how it is likely the construction and operation of WaterFix facilities will incentivize and likely lead DWR and the Bureau to export more stored water than the recent baseline in wetter water years. If the State Board approves the change in the point of diversion at issue in this proceeding, it must to protect storage in Shasta Reservoir and the public trust uses and values that depend on it. In such case, the State Board should at minimum incorporate into revised CVP permits the numeric storage requirements for Shasta Reservoir that are present in the current NMFS BiOp for salmon. The Board should do so without the exception language that allows the Bureau not to meet the storage targets in some water years.

The Board should also incorporate into CVP permits and enforce protection from fall redd dewatering in the Sacramento River from Keswick Reservoir throughout the salmon spawning reach. The Board should incorporate into CVP permits and enforce the temperature requirements in WRO 90-05 (SWRCB-24) that many reference but that the Board and the fisheries agencies routinely do not enforce. The Board should tighten the requirements for the WRO 90-05 temperature compliance points on the Sacramento River, tying them to specific objective conditions, reducing or preferably eliminating agency discretion about moving those compliance points upstream.

Additionally, if the Board grants the CWF petition for change in point of diversion, the Board should modify CVP's permits the Board to limit the export of stored water through both the North Delta Diversion and the existing south Delta facilities if such export will cause violation of the Sacramento River temperature standards. The Board should include an additional term to curtail CVP diversions following years in which there are violations of the WRO 90-05 Sacramento River temperature standards (including the modifications I have recommended).

B. The Board should adopt the carryover storage and other operations conditions for Trinity Reservoir that the Pacific Coast Federation of Fishermen's Association et al. recommends in this proceeding.

To the degree that we have knowledge of the carryover storage and other operational recommendations of the Pacific Coast Federation of Fishermen's Association et al. (PCFFA et al.) for carryover storage and other operations at Trinity Reservoir, CSPA et al. supports them. The conditions should be clear, enforceable and mandatory. If CSPA et al. develop concerns with the recommendations of PCFFA et al. after the presentation of the case-in-chief of PCFFA et al., CSPA et al. will present those concerns in rebuttal.

C. The Board should adopt the carryover storage and other operations conditions for Folsom Reservoir that the Water Forum recommends in this proceeding.

To the degree that we have knowledge of the carryover storage and other operational recommendations of the Water Forum for carryover storage and other operations at Folsom Reservoir, CSPA et al. supports them. The conditions should be clear, enforceable and mandatory. If CSPA et al. develop concerns with the recommendations of the Water Forum after the presentation of the Water Forum's case-in-chief, CSPA et al. will present those concerns in rebuttal.

D. The Board should adopt carryover storage requirements for Oroville Reservoir for September 30 and December 31.

1. The Board needs to require carryover storage in Oroville Reservoir that will provide assurance under 99% exceedance that DWR can meet the following water year's in-basin uses, including fish protection, without any Temporary Urgency Change Orders.

In my testimony in Part 1 of this hearing, I stated: "There is no basis to assume that additional diversion of unregulated flow using CWF facilities will reduce pressure on SWP and CVP reservoirs. Instead, it is much more reasonable to expect that the availability of greater, more frequent and more efficient export capacity because of CWF will add unregulated exports to existing and in some cases greater levels of export of stored water." (CSPA-4-rev, p. 3).

In his rebuttal testimony in Part 1 of this proceeding (DWR-78), SWP operator Mr. John Leahigh described how "[CA WaterFix's] return of flexibility would make the Projects less reliant on upstream storages to meet Project objectives." (DWR-78, p. 10, ll. 10-11). Mr. Leahigh further stated on rebuttal that "no level of storage is an absolute guarantee to meet all water needs during a succession of dry years … ." (*Id.*, p. 10, ll. 19-20). Finally, Mr. Leahigh argued that "the CWF project would be neutral to water management during the exceptional droughts of which we have just experienced … ." That certainly sounds like the "flexibility" that CWF proponents seek would enhance water supply reliability but would assure no benefits for fish and wildlife resources during droughts.

Should the Board grant the WaterFix petition, the Board should create assured benefits for fish and wildlife by conditioning the permits to require compliance with water quality and environmental standards without reliance on Temporary Urgency Change Orders. An essential means to achieve such compliance is to condition the SWP permits with protective carryover storage requirements for Oroville Reservoir. This does not request that the Board "absolutely guarantee" anything. The Board can and should decide on an appropriate level of risk for fish and wildlife and write a condition to limit SWP operation to that risk. The level of risk protection should be high: CSPA recommends 99% exceedance. The Board should require carryover storage that meets that requirement. It should also put DWR on notice that the Board intends to hold the line on permit terms, and that Temporary Urgency Change Petitions are not part of the normal course of business.

2. DWR's carryover storage "policy" for Oroville Reservoir is substantively inadequate.

During cross-examination on rebuttal during Part 1 of these hearings, DWR presented Exhibit DWR-902, DWR's "Monthly Water Operations Report" for February 2012. As far as I could find, this was the first numeric statement of DWR's baseline operation of Oroville Reservoir anywhere in it petition or supporting environmental documentation.

Embedded on page 8 of DWR-902 is an equation that DWR witness and operator John Leahigh represented as expressing DWR's "policy" on carryover storage at Oroville Reservoir (Hearing Transcript, May 9, 2017, p. 17, ll. 9-13) That equation reads as follows:

> **Lake Oroville storage target =**
> **1.000 MAF + "F" x (3.045 MAF - 1.000 MAF) on September 30;**
> **where "F" = 1/2 x Possible Table A %.**

Mr. Leahigh referred to the "1.000 MAF" (1 million acre-feet) part of the equation as a "floor" number, the minimum storage target for Oroville storage on September 30 (Hearing Transcript, May 9, 2017, p. 22, l. 22). The number in red (also in red in the original) is the previous year's September 30 storage level, also expressed in million acre-feet. "F" is one-half the possible amount of total annual SWP Table A deliveries to State Water Contractors in the upcoming water year. "F" becomes a multiplier of the difference between the previous year's September 30 Oroville storage (in this case 3.045 MAF) and the value of the floor (in this case, 1.000 MAF). In each successive month from February through about mid-April, the formula can change. It is an iterative target that does not become final until April of any given water year, when DWR sets the final Table A percentage.

As I understand Mr. Leahigh's explanation in the rebuttal phase of Part 1 of this hearing, the purpose of the "policy" is to require somewhat higher carryover storage as deliveries to SWP Table A Contractors increase. As he characterized it in his rebuttal testimony in Part 1 of this hearing, the SWP has a "policy of leaving higher levels of carryover storage in Lake Oroville as current year delivery capability increases. Greater emphasis is given to the next year's objectives as the current year's objectives are increasingly satisfied. This supplementary storage is in addition to providing a reasonable level of carryover storage necessary to meet Project obligations should the following year be dry." (DWR-78, p. 9).

In order to evaluate the augmentation to carryover storage that this equation might provide, I assembled a simple spreadsheet. I used data that DWR provided in an Excel spreadsheet served on the parties on June 20, 2017; DWR represented in a cover e-mail that this data underlies the summary data shown in Exhibit DWR-906. Specifically, I took the end-of-

September historical storage data for Oroville for the years 2000-2016 shown in Column E of the "storage" tab of this DWR spreadsheet. I also took the percent of historical Table A deliveries for the years 2000-2016 shown in Column E of "SWP" tab of this DWR spreadsheet. Using this data, I made a simple formula in Excel to calculate the storage target for each year from 2000 through 2016, consistent with the equation on page 8 of DWR-902. I also modified the equation to show alternative "floor" values in the equation in DWR-902. Finally, I then constructed a new Excel spreadsheet, a pdf of which is now Exhibit CSPA-313.

Based on review of the data, I arrived at the following conclusions. In the big picture, the strength of DWR's "policy" that ties carryover storage increases to levels of export is weak under the formula shown above that Mr. Leahigh presented in DWR-902. Mr. Leahigh described on further cross-examination in the rebuttal phase of Part 1 of this hearing that DWR had recently modified the floor figure, changing it to 1.3 MAF. (Hearing Transcript, May 9, 2016, p. 21, lines 21-26; p 22, l. 1) On analyzing how the increase in the floor would affect the outcome, I found that in ten of the seventeen years from 2000 through 2016, that 300 TAF increase in the floor would have a greater impact on target storage than the portion of the equation that incorporates the anticipated level of exports. With the 1.3 MAF floor that Mr. Leahigh stated is current policy, I repeated the exercise, finding that the benefit from increased SWP deliveries is even smaller. I repeated the exercise one last time to evaluate a 1.6 MAF floor.

In sum, I found that the average annual benefit to the "policy" with a 1 MAF floor is 282 TAF. With a 1.3 MAF floor, the average annual benefit is 203 TAF. With a 1.6 MAF floor, the average annual benefit is 137 TAF. One could compare this to a savings account that in the first instance starts with a low interest rate. As the principal in the bank (the "floor") increases, the already-low interest rate declines.

My preliminary conclusion is that the State Board should require an end-of-October carryover storage requirement for Oroville Reservoir of at least 1.6 MAF. An additional formula to increase that requirement as export deliveries increase, similar to the equation in DWR-902, is also appropriate. To start, the Board should evaluate the previous equations

employed by DWR, as shown on Slide 7 of Exhibit DDJ-206. While this condition is needed under existing conditions, granting the WaterFix petition would make it even more compelling. The availability of additional export capacity at the North Delta Diversions would increase opportunities to export additional stored water, notwithstanding DWR's professed "policy" or the Bureau's even vaguer "principle."

In addition to evaluating end of September Oroville storage, I paid particular attention to the differential between End of September and End of December Oroville storage in years 2007. 2007 was a Dry year that followed a Wet year. 2013 was a Dry year that followed a Below Normal year. In each year, Oroville storage dropped more than 340 TAF over the three-month period, ending at a level below 1.3 MAF. In 2007, there were significant discretionary releases from Oroville and high SWP export levels in the October-December months. In 2013, there were some, but fewer discretionary releases from Oroville in October-December, with still significant SWP exports. (See CSPA-314 and CSPA-315). The last three months of these years ushered in Critically Dry water years. It appears that there needs to be some mechanism to maintain end of December storage at or near end of September levels. This may require that releases from storage during dry October-December periods be kept at or near the minimum required release.

3. DWR's current carryover storage "policy" for Oroville Reservoir as described in Exhibit DWR-902 is unenforceable and is subject to instant change without any set process, regulatory oversight or environmental review.

On cross-examination in rebuttal, Mr. Leahigh reported that the DWR carryover storage "policy" for Oroville expressed in the equation shown in Exhibit DWR-902 is subject to revision on an ongoing basis. (Hearing Transcript, May 9, 2016, p. 22, lines 2-27). The documents that contain the equation, though updated monthly, are not posted on the internet. (Hearing Transcript, May 9, 2016, p. 26, lines 4-12). The process of changing the equation is thus no more a public process than the equation was available to the public prior to the production of DWR-902 in this proceeding. There is evidently no formal process for review of

DWR's carryover storage policy for Oroville, and there is clearly no environmental review. An internal DWR policy that can change at any time is by definition unenforceable. This lack of regulatory oversight and process and lack of public review must change.

E. The Board must set enforceable carryover storage requirements for Oroville Reservoir in the permit conditions for the SWP and must set enforceable carryover storage requirements for Trinity, Shasta, and Folsom reservoirs in the permit conditions for the CVP.

The Board must condition the water rights permits of the SWP and CVP respectively to require carryover storage requirements for Oroville Reservoir (SWP) and for Trinity, Shasta and Folsom reservoirs (CVP). These requirements must be clear and enforceable. There must be requirements for each reservoir. These requirements must balance protections and effects for fish and wildlife in each of the affected watersheds. There must be consequences for failure to meet the requirements.

IV. THE ADAPTIVE MANAGEMENT CONSTRUCT THAT PETITIONERS PROPOSE TO DETERMINE WATERFIX OPERATIONS LACKS ACCOUNTABILITY, IS OVERLY BROAD, AND IS UNENFORCEABLE.

Water Code § 85086 (c)(2) requires: Any order approving a change in the point of diversion of the State Water Project or the federal Central Valley Project from the southern Delta to a point on the Sacramento River shall include appropriate Delta flow criteria … ." The fact that this Section also requires that appropriate Delta flow criteria for the "be subject to modification over time" does not absolve the Board from setting a protective flow requirements ***now***.

A. 2014 and 2015 SWP and CVP Drought Operations: A Case Study In The Failure Of Adaptive Management To Protect Fish And Wildlife

In 2014 and 2015, DWR and the Bureau submitted a series of Temporary Urgency Change Petitions (TUCPs) to the Board to "relax" various D-1641 and other water quality and flow requirements for the SWP and CVP. The Board granted these petitions in substantial part.

The documentary history is available on a Board webpage at:

https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/index.shtml

In granting these petitions, the Board reduced Vernalis flow and Delta outflow requirements, moved a water quality compliance point on the Sacramento River from Emmaton to Three-Mile Slough, and increased allowed water temperatures in the Sacramento River downstream of Keswick Dam. The Temporary Urgency Change Orders (TUCOs) effectively placed management of the Bay-Delta system in the hands of the Real Time Drought Operations Management Team, referred to by the cumbersome acronym RTDOMT. This "Team" was made up of representatives from CDFW, USFWS, NMFS, State Board staff, DWR and the Bureau. While the meetings and minutes of the RTDOMT are not public, my understanding is that this "Team" consisted largely of managers, with some input from technical staff. The TUCOs in 2014 and 2015 allowed DWR and the Bureau to "conserve" water in upstream reservoirs by reducing Delta flow and water quality requirements; in 2015, there were 800 TAF of this "conserved" water. (CSPA-317, p. 27). Nonetheless, this non-public management group utterly failed to protect fish. The Executive Director of the Water Board reported: "[T]he 2014 winter-run brood year (BY) is estimated to have experienced 95 percent mortality." (CSPA-301, p. 11). Water Rights Order 2015-0043 (CSPA-317, p. 4) bluntly describes the gruesome outcome of two years of operations under Temporary Urgency Change Orders:

> Despite the efforts to protect winter-run Chinook salmon in 2015, the run appears to have experienced even higher mortality rates than in 2014. This likely occurred in part due to inadequate temperature management actions and other operational issues associated with incomplete information, untimely information exchange, misinterpretation of available data, and inadequate planning and responses. While the 2015 TUCP Order, TUCP Order modifications and TMP attempted to address these issues, which also existed in 2014, they were unsuccessful, establishing the need for more rigorous requirements going forward.
>
> At the same time winter-run Chinook salmon experienced high mortality rates, numerous other threatened, endangered and commercially important species, including longfin smelt, Delta smelt, fall-run Chinook salmon, spring-run Chinook salmon and steelhead, also experienced significant population declines in 2015. The severity and duration of the decline of these species during the drought is a significant concern. In particular, no

longfin smelt have been caught in surveys this fall and nearly no Delta smelt have been caught, leading to real concern that these species may be at the brink of extinction.

Without evidentiary process, the Executive Director of the Board nevertheless found that none of the actions taken under the TUCOs for the SWP and the CVP in 2015 had unreasonable effects on fish and wildlife. (CSPA-317, pp. 35-43). WRO 2014-0029 made similar findings for 2014.

It is people from the same agencies, with the same lack of oversight and the same lack of public process, whom the WaterFix petitioners propose should "adaptively" determine the flow requirements and other operational rules for the SWP and CVP with WaterFix facilities in place. It is fair to anticipate that there will be the same lack of environmental review, since the fundamental approach of petitioners has been to attempt to somehow bracket the alternatives and then affirm that environmental analysis is covered within a range of options.

B. The Proposed Use of Adaptive Management Defers Fundamental Operational Decisions.

In the D-1641 hearings, the Board heard evidence, made findings and set rules. CSPA strongly disagrees with many of these rules. But at least there are rules. The issue that D-1641 deferred, the "Phase 8" apportioning of additional responsibility for meeting water quality objectives, was a can kicked so far down the road that will end up in the recycle bin before it is ever opened.

Over the course of ten years' experience in water rights proceedings, I have responded to many proposed projects and actions. Whether I was dealing with applications for new water rights or petitions for change, in protest resolution or in hearing, I understood generally what the water right holder or applicant was proposing to do. I understood proposed project operation. I also understood protection, mitigation and enhancement measures that the applicant or petitioner proposed to implement as conditions in a new or revised water right. These measures generally included minimum instream flow requirements past diversions, ramping rates at such diversions, and reservoir storage levels (where applicable), as well as measures to protect and monitor terrestrial species.

In the present water rights hearing, the proponents have not defined an operations plan. In their August 31, 2017 Ruling, the Hearing Officers directed DWR and the Bureau to "provide an updated summary of operating criteria that makes explicit whether particular criteria are proposed conditions of operation or are set forth solely as modeling assumptions." In the *Petitioners' September 8 Response* (CSPA-256), DWR and the Bureau offer no affirmative statement of how they plan to operate California WaterFix facilities.

The *Petitioners' September 8 Response* does not describe how DWR and the Bureau will coordinate operation of WaterFix facilities with other SWP and DVP facilities. Consistent with their past approach in this proceeding, the *Petitioners' September 8 Response* lists a series of proposed constraints for California WaterFix facilities. These proposed constraints are variable, with no clear statement of when one set of constraints would apply instead of another set. Many of the constraints are labelled as "Final EIR/EIS Criteria," but not one is clearly stated as a proposed permit term. In thinking about this document, I keep thinking of the phrase "player to be named later" as applied to trades among sports teams. In this case, all the players are players to be named later.

There are only two unequivocal statements of proposed permit terms in the *Petitioners' September 8 Response*. First: "Petitioners propose that the California WaterFix be conditioned upon the terms contained in Water Rights Decision 1641 ("D-1641")." (*Petitioners' September 8 Response*, p. 1) Second: "Therefore as part of this project, Petitioners are requesting that the Hearing Officers incorporate the adaptive management process into the water rights permits, and Petitioners are not proposing as conditions the operational criteria contained within the Biological Opinions and 2081 (b) Incidental Take Permit." (*Petitioners' September 8 Response*, p. 2).

If, for the sake of argument, one was to assume that the tables presented in *Petitioners' September 8 Response* were meaningful recommendations about proposed bypass flows for the North Delta Diversion, one would be no closer to having an operations plan to evaluate. The charts on pages 7 and 8 show three different tables for "post pulse bypass flows." The document

proposes no starting point for when any or all of the requirements on any or all of these tables would apply.

C. The Petitioners' Proposed Use of Adaptive Management Is Inconsistent with My Experience in Successful Adaptive Management Programs.

For the last ten years, I have been part of an adaptive management work group (the "Ecological Resources Committee") on the North Fork Feather River. The Committee implements the FERC license for PG&E's Rock Creek – Cresta Hydroelectric Project. The Federal Energy Regulatory Commission (FERC) license for the project clearly defines three ranges of flows for each project-affected reach. Each range covers a five-year period. Every five years, the Committee has evaluated the trout fishery in the reach and adjusted flow, generally increasing it, based on monitoring of fish populations and angler success. The Committee evaluated the monitoring results against pre-determined metrics of biological performance. The Committee did this within a defined decision space and specific timelines. In some cases, based on scientific evaluation and recreational interests, we had to change the rules outside the decision space. However, to change the decision space, we went through the process of amending the Forest Service's conditions for the license and of amending the license itself. There was a formal regulatory process that allowed for formal participation in the license amendment proceeding. FERC, the regulatory agency, was never involved in substantive discussions of any license amendment prior to the time the licensee formally filed to amend its license.

Formal process is not the model for adaptive management that petitioners have presented in this proceeding.

In the implementation of FERC licenses, I am used to deferring some measure of decision to investigation based on science, monitoring, and performance metrics. However, I have never seen a situation in which stakeholders accepted conditions that were known to be harmful to fish and wildlife (such as conditions under the requirements of D-1641) in order to delay fundamental decisions to an undefined adaptive management process with undefined metrics for evaluating success in protecting public trust resources.

V. IT IS NOT IN THE PUBLIC INTEREST TO SUBSTITUTE PROCESS FOR DEFINED PROTECTIONS FOR FISH AND WILDLIFE IN WATER RIGHT PERMIT CONDITIONS.

Other than D-1641 and an adaptive management program, petitioners recommend no operations plan, initial or otherwise, for the CA WaterFix. The Biological Opinions and the Incidental Take Permit do no better.

The NMFS BiOp for WaterFix requires on p. 1183: "Within one year of biological opinion issuance, Reclamation and DWR shall establish the following multi-agency technical teams for major components of the PA." The NMFS BiOp continues on p. 1184: "Reclamation and DWR shall ensure that the technical teams described in Term and Condition 2.a. complete the following tasks." On p. 1192, the NMFS BiOp proposes: "implement a phased test period at the NDD to include monitoring of biological and physical parameters across a range of pumping rates and flow conditions prior to operating the north Delta diversions at full capacity." (SWRCB-106). Thus, this Biological Opinion as well suffers from the pitfall of requiring such things as staffing for future projects and monitoring and in place of requiring specific conditions or measures.

The USFWS BiOp for WaterFix announces itself as programmatic. (SWRCB-105, p. 9).

The DFW Incidental Take Permit proposes to leave initial operations to other processes. In its Attachment 5 on Adaptive Management, the ITP states:

> During **Phase 1**, initial operation and research priorities are set through the respective Operational criteria established through the BiOps, CESA authorizations and Bay Delta Water Quality Control Plan and Science plans. The operations criteria set water supply expectations while the science plans address how uncertainties associated with the operational and stressors affecting covered species will be addressed. (SWRCB-107, Attachment 5, p. 14).

It is not in the public interest to leave operation of what would be the most expensive water infrastructure project in California history to be determined by other processes. It is not in the public interest to allow bonding entities to set aspirational expectations for the water supply benefits of such a project without defining those benefits. It is not in the public interest to leave

adaptive managers of fishery agencies and water supply agencies, operating without public regulatory process, as the firewall between economically and politically supported water supply aspirations and protections for fish and wildlife.

The Board cannot control the inadequacy of the ESA and CESA requirements that NMFS, USFWS and CDFW have set forth or failed to set forth. If the Board grants the WaterFix petitions, the Board can and should set permit conditions for the SWP and CVP that in their own right protect affected fish and wildlife resources, beginning from the day the petitions take effect.

Executed this 29th day of November, 2017 at Berkeley, California.

Chris Shutes