February 8, 2023

Joaquin Esquivel, Chair
Members of the Board
State Water Resources Control Board
1001 I Street
Sacramento, CA 95214
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Transmitted via email

Re: Comments of California Sportfishing Protection Alliance, California Water Impact Network, and AquAlliance on the Draft Scientific Basis Report Supplement in Support of Proposed Voluntary Agreements for the Sacramento River, Delta, and Tributaries Update to the Bay-Delta Water Quality Control Plan

Dear Chair Esquivel and Members of the Board:

The California Sportfishing Protection Alliance, California Water Impact Network and AquAlliance (collectively, CSPA et al.) respectfully comment on the Draft Scientific Basis Report Supplement in Support of Proposed Voluntary Agreements for the Sacramento River, Delta, and Tributaries Update to the Bay-Delta Water Quality Control Plan (hereinafter, "Draft Supplement"). The State Water Resources Control Board (State Water Board or Board) released the Draft Supplement on January 5, 2023. These written comments add to oral comments that CSPA made at the January 19, 2023 Board workshop dedicated to the Draft Supplement.

I. Overview

The Draft Supplement is a *post hoc* justification for the unfounded and fundamentally flawed premise that physical habitat enhancement can substitute for adequate flows in the Sacramento River and its tributaries, the Mokelumne River, and the Sacramento – San Joaquin Bay-Delta estuary. While physical enhancements can add benefits to adequate flows, they are not a substitute for adequate flows. The comments of NRDC et al., and the presentations of Jon

Rosenfield and Julie Zimmerman at the Board's January 19 workshop, analyze this basic fallacy that underlies the Supplement.[1]

These comments focus, rather, primarily on the deficiencies of the Draft Supplement in providing a basis for the proposed flow measures in the forthcoming proposed "Voluntary Agreements" (VAs). These proposed flow measures would, if adopted by the Board, supplant the percent-of-unimpaired-flow approach analyzed in the 2017 Scientific Basis Report[2] that the Draft Supplement supplements, and further discussed in the 2018 "Framework" also released by the Board.[3]

The flow components discussed in the Draft Supplement are, like the physical habitat improvements described therein, a desired outcome in search of a justification. The analysis of flow components in the Draft Supplement fails to establish a scientific basis for the VA flows because:

- The flows described in the "VA Term Sheet"[4] do not describe the rules and mechanisms for their implementation, and are thus too vaguely defined to quantify or otherwise understand in terms of timing and amount;
- The Draft Supplement does not clearly explain the existing flows which the VA flows will purportedly "increase;"
- The Draft Supplement does not explain the accounting by which uncaptured flow will not be counted as "additive" flow;
- The Draft Supplement does not address how "additive" flow will not later result in offsetting flow reductions;
- The Draft Supplement inappropriately relies on modeling that chunks extra water into various points in the system without corresponding rules and mechanisms that as a matter of practice would actually achieve the modeled flows and flow volumes;
- The Draft Supplement does not identify the flow thresholds that VA flows will exceed that will create substantial improvements in fish populations, or how and how often the VA flows will exceed those flow thresholds;
- The Draft Supplement does not explain how the absence of measures to address Critically Dry years and droughts would allow the VAs to overcome population crashes of fish during dry year sequences;

[1] We incorporate by reference the presentations of Dr. Rosenfield and Dr. Zimmerman, and the written comments of NRDC et al.

[2] State Water Board (2017), Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows.

[3] State Water Board, July 2018 Framework for the Sacramento/Delta Update to the Bay-Delta Plan, available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/sed/sac_delta_framework_070618%20.pdf.

[4] *Memorandum of Understanding Advancing a Term Sheet for the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan, and Other Related Actions* (Voluntary Agreements Parties 2022; MOU; hereafter referred to as the VA Term Sheet).

- The Draft Supplement does not consider how the VAs would meet or not meet the requirements in the 2017 Scientific Basis Report to address water temperature management and in the 2018 Framework to address storage in reservoirs.

We discuss these and related issues below.

II. The proposed "additive" flows described in the VA Term Sheet do not describe the rules and mechanisms for their implementation and are too vaguely defined to quantify or otherwise understand in terms of timing and amount.

The caption for Table ES-1 ("Proposed VA Assets") states in part: "Flow assets are proposed to be additive to the Delta outflows resulting from State Water Board Revised Water Right Decision 1641 (D-1641) and the implementation of the 2019 Biological Opinions for operations of the State Water Project and Central Valley Project."[5]

There is a fundamental problem with setting up flow volumes as "assets." One does not know until after the fact what the outflows under D-1641 and he 2019 Biological Opinions (Trump BiOps) would have been. Therefore, one does not know as it is happening what volume of water one is purportedly adding flow to. Thus, one cannot answer the question, additive flow compared to what?

The VA's propose to add to existing flows that are determined by a series of constraints. These constraints only sometimes prescribe the actual flow at any given location. These constraints also, for example, limit flow reductions or require releases from storage to meet certain flows, ramping rates, or water quality parameters such as salinity.

A. There are no clear rules and mechanisms for "additive" flow in rivers.

In rivers, the constraints are generally stated as minimum flows. But often, for various reasons, the actual flows are greater than the required minimum flows. These reasons include additional power generation, water deliveries (including deliveries south of the Delta), flood control releases, tributary inflows, and more generally uncaptured flows. It's a relatively simple accounting matter when the minimum flow is the actual flow. But if the VA flow "asset" is coincident with flows already greater than the minimum flow, does that already greater flow count as part of the VA asset?

Another way of looking at flow "assets" in rivers is a reduction in the end-of-year storage target for a reservoir from which river flows are sourced. This is the apparent approach in the Yuba River VA: Yuba County Water Agency plans to reduce its end-of-year storage target in New Bullards Bar Reservoir by a volume equivalent to its promised flow assets. Yet this too is

[5] Use of the unlawful 2019 Biological Opinions as the basis for comparison means that between 25% and 40% of the VAs' "increased" flow merely would backfill flow taken away in 2019. Though the Draft Supplement attempts to address the inappropriate use of the 2019 BiOps, greater clarity about their relation to the analysis is needed.

problematic, because in relatively dry years, and not just "Critically Dry" years when YCWA has proposed no flow "assets," YCWA will drop below the New Bullards Bar storage target under existing operations. The storage target is a self-imposed target, not a regulatory requirement. So the "asset" may amount to water that YCWA was going to release anyway, though perhaps at a different time of year.

Still another issue for river flow "assets" are flows that simply get moved from one part of a year to another. The modeling for the Mokelumne River VA shows that most of the water promised in most years (45 TAF in Mokelumne River "Normal and Above" water-year types, 20 TAF in "Below Normal" water-year types, and 10 TAF in "Dry" water-year type) would subsequently be recovered by East Bay Municipal Utility District November flood control requirements in Camanche Reservoir. In addition, the Mokelumne VA as we understand it would require volumes of flow above required minimums in specified months. If flood control releases from Camanche Dam that EBMUD must release regardless of the VAs achieve those volumes, the VA requirements would be considered achieved as well. EBMUD has been transparent about these facts, and for that reason Table ES-1 in the Draft Supplement reflects only the average annual net flow increase for the Mokelumne River.

B. There are no clear rules and mechanisms for "additive" Delta outflow.

Existing Delta flow requirements are a combination of numeric flow requirements, salinity standards at various locations, ratios of Delta inflows to Delta export diversions, restrictions on "reverse flows" in the southern Delta, and others. These requirements are largely required by Water Rights Decision 1641 (D-1641), the 2019 Trump BiOps, and the California Department of Fish and Wildlife's (CDFW) Incidental Take Permit (ITP) for the operation of the State Water Project (SWP). This is far from a simple minimum flow number that a VA could equally simply add flow volumes on top of.

Reis et al. (2019)[6] describe the controlling factors of actual Delta outflow from 2010-2018. Reis et al. found that, "Taken together, [Additional Uncaptured Outflow] and those outflows needed to maintain the [Hydraulic Salinity Barrier] accounted for the vast majority of actual Delta outflow."[7] This begs two questions. First, how does one "add" outflow to uncaptured outflow? Second, how does one calculate "additive" outflow to the inflow needed to meet Delta salinity requirements? We address each in turn. We also address the notion in the VA Term Sheet of using "exports foregone to create "additive" Delta outflow.

1. "Additive" Delta outflow above uncaptured outflow.

To add outflow to uncaptured outflow, one could theoretically release water from storage, or bypass reservoir inflows, on top of already uncaptured flow. This assumes one could time the

[6] Gregory J. Reis, Jeanette K. Howard, and Jonathan A. Rosenfield, Clarifying Effects of Environmental Protections on Freshwater Flows to—and Water Exports from—the San Francisco Bay Estuary, San Francisco Estuary Institute and Watershed Science, March 2019, https://escholarship.org/uc/item/8mh3r97j.
[7] *Id.*, p. 17.

arrival in the Delta of water released from reservoirs. There are other assumptions as well, such as that water released from storage would not be diverted before it reached the Delta, by existing or future legal diverters.[8] It also assumes that the additional water released from storage would not be exported when allowed exports under the D-1641 Export/Inflow ratio enabled export increased as a result of the "additive" inflow. A large concern, as mentioned above, is that water that is counted as part of the VA's "additive" flow telescopes into uncaptured water that would have been outflow anyway, without any VA.

2. "Additive" Delta outflow above outflow controlled by salinity requirements.

When salinity is controlling Delta outflow, "adding" flow presents its own series of problems.

First, there are many ways of complying with Delta salinity requirements. These requirements are often established on a running average over time because of intra-daily and monthly tidal variation and difficulty of measurement. Thus, there is a highly variable basis of comparison for what one might be adding flow on top of.

As a practical matter, when storage releases are needed to control salinity, transit times from reservoirs to the Delta, between one and six days, render operator adjustments to meet standards far from instantaneous. This adds complexity to distinguishing "required" flow and "additive" flow.

More generally, how does one "add" flow on a real-time basis to achieve some defined volume of additional outflow when the basis of comparison is a three-day, fifteen-day, or thirty-day running average? Or a salinity standard at a location for a certain number of days? Or, at best, a numeric value for a calculated flow index, not a measured flow?

D-1641 Table 3 sets a series of contingencies for required Delta outflow. First is a numeric flow requirement, stated in the table for the months from July-January. For the months of February-June,[9] there is a floor numeric requirement based on a 3-day running average; the 7100 cfs floor may be reduced in May and June of defined dry years as described in Table 3, footnote 10. Footnote 10 ties these flow requirements to the "Eight River Index," an index of the sum of water-year unimpaired runoff to date, defined in footnote 9.

Layered onto the February-June numeric flow requirement is a salinity compliance requirement: footnote 10 also states: "Additional Delta outflow objectives are contained in Table 4." D-1641 Table 4, in turn, is entitled, "Number of Days When Maximum Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained at Specified Location." The

[8] This begs the question in some cases of why one would be paying for water to meet public trust purposes when private entities were diverting water without paying for it.
[9] Most, but not all, of the VA flow "assets" appear intended for deployment in February-June. *See* Draft Supplement, tables 4-1 and 4-11.

compliance locations are Chipps Island and the eastern end of Suisun Bay and Port Chicago[10] at the western end of Suisun Bay. The requirements are stated as the number of days the daily EC standard must be met, based again on the Eight River Index. However, Table 4, footnote (a) also allows alternative forms of compliance, reproduced below because there are too many options to summarize:

> The requirement for number of days the maximum daily average EC (EC) of 2.64 mmhos per centimeter (mmhos/cm) must be maintained at Chipps Island and Port Chicago can also be met with maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average NDOIs of 11,400 cfs and 29,200 cfs, respectively. If salinity/flow objectives are met for a greater number of days than the requirements for any month, the excess days shall be applied to meeting the requirements for the following month. The number of days for values of the PMI between those specified in this table shall be determined by linear interpolation.

3. "Additive" Delta outflow based on "exports foregone."

The VA Term Sheet promises passing volumetric water additions from the Sacramento River and its tributaries through the Delta as Delta outflow. The VA Term Sheet describes no mechanism to assure that these Delta inflows from the Sacramento River and its tributaries will not be captured and exported by the south Delta pumps of the SWP and the Central Valley Project (CVP).[11] Table ES-1 does propose 125-175 acre-feet per year (afy) of "exports foregone" in Dry, Below Normal, and Above Normal water year types. However, this is far short of the VAs' advertised total additive Delta outflow. In addition, "assets" fashioned as "exports foregone" have their own accounting and implementation issues.

A major issue here is, once again, foregone compared to what? The SWP and CVP pumps rarely operate at full capacity, and often do not operate at maximum allowed export rates under D-1641 and the BiOps. Opportunity foregone only adds flow when it supplants a situation where that opportunity would have been exercised. Conceptually, any operation in which actual export did not take full advantage of available export could be credited as "exports foregone." This could include periods of maintenance or other operational downtime, which moreover could be scheduled to coincide with the credited "exports foregone."

Allowed export rates under D-1641 are a calculation based on tangle of averages, exceptions, and contingencies; *see* D-1641 Table 3 (esp. "Delta Outflow" and "Export Limits),

[10] Footnote (d) to Table 4 limits the applicability of the Port Chicago requirement: "This standard applies only in months when the average EC at Port Chicago during the 14 days immediately prior to the first day of the month is less than or equal to 2.64 mmhos/cm." Operators have gamed the "Port Chicago trigger" by decreasing outflows and thus increasing salinity at the end of the month.

[11] The 2017 Scientific Basis Report and the 2018 Framework do no better on this score, relying on the concept of "inflow-based outflow," with mechanisms to be defined in the future.

and accompanying footnotes 18, 19, and 20[12] and Figure 3 (describing Net Delta Outflow Index, or NDOI).

For example, allowed exports are subject to the Export/Inflow (E/I) ratio. When the SWP and CVP are releasing stored water for export, Delta inflow, per footnote 19, is based on a 3-day running average. However, the calculation of Delta inflow changes to a 14-day running average when the SWP and CVP are not releasing stored water for export.[13] From April 15 - May 15, there is also an export limitation based on San Joaquin River flow, but this is explicitly subject to modification by the state and federal fisheries agencies on approval by the Board's Executive Director.[14] General export limits are also subject to such modification by the fisheries agencies or by the Executive Director.

It is also essential to consider that Delta outflow is a calculated value, not a measured one. There is no gauge to measure compliance. NDOI uses measured values at locations where water flows into the Delta and a calculation to determine in-Delta diversions and other depletions. "Additive" Delta outflow from the VAs will not be measured. It will be calculated by adjusting the values of Delta inflow at Freeport and Woodbridge, and perhaps at Vernalis if San Joaquin parties were to become part of the VAs. NDOI is notoriously inaccurate during periods of low Delta outflow.[15] The reality of whether there will be "additive" Delta outflow as a result of the VAs' "exports foregone," and, if any, how much additive Delta outflow there will be, is bound up in the relative accuracy of the calculations that make up the NDOI.

There is another issue as well. Foregoing the opportunity to export water may simply provide another opportunity at a later time. "Additive" Delta outflow, assuming for that sake of argument that it exists, may help meet longer-term salinity requirements and thus change the controlling actual constraints on future exports, allowing export of all or part of the "exports foregone" later in the month.

C. The Draft Supplement provides no foundation that the VAs will provide "additive" river flows and Delta outflow by the amounts represented in the VA Term Sheet

The VAs are an act of faith, not only in the proposition that they will improve conditions for fish, but also in the representation that they will actually provide the "additive" volumes of

[12] This numeration is modified in adopted Appendix K (Dec. 12, 2018) for Phase I of the update of the Bay-Delta Plan: Final Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento San Joaquin Delta Estuary San Joaquin River Flows and Southern Delta Water Quality, Appendix K ("Revised Water Quality Control Plan with Adopted Changes"). The revised numbers are 16, 17, and 18. Appendix K also shows D-1641 Figure 3 as Figure 4. For consistency, we use the numeration in Revised D-1641.

[13] D-1641, Table 3, footnote 19. It is unclear whether the 3-day or 14-day average would apply when the SWP and CVP were "voluntarily" releasing additional stored water to meet outflows while some water was being exported.

[14] It also relates to a Vernalis pulse flow requirement that the CVP has ignored since 2012, but which has not been supplanted by implementation of the flow objectives for the lower San Joaquin River adopted in 2018.

[15] See "What is wrong with NDOI?" at https://calsport.org/fisheriesblog/?p=87.

flow they profess. Moreover, compliance oversight is difficult or impossible in real-time, and will need to rely on after-the-fact accounting that will likely make real-time correction or enforcement infeasible.

III. The operations modeling in support of the Draft Supplement is limited to an approximation of the desired outcome.

The modeling of "additive" flow "assets" that the Draft Supplement presents fundamentally confuses the map and the territory. A proper description of existing Central Valley operations and proposed future operations under the VAs would describe what proponents have asked modelers to model and then describe how their model makes fundamental and basic decisions to achieve the requested outcome. It would describe the specific operational changes the VA proponents proposed to make to achieve their "additive" flows. Part of the exercise would be to use the model to evaluate whether the model could simulate, with the direction given, operations that achieved the stated desired outcome.

Since neither the Draft Supplement nor the VA Term sheet has provided a description of such proposed operations, it is reasonable to assume that the model has not responded to such direction. Rather, it appears that the model has been told to assume a certain amount of "additive" river flow and Delta outflow, and then show how the system covered by CalSim would perform. The model output thus produced shows the flows that assume the outcome the VAs seek to produce, or at least to advertise. This assumed outcome then becomes the basis for comparison of purported benefits.

It is highly likely that the values presented in the operations model output in the Draft Supplement overstates the volume of flows that the VAs will generate. This likely overstatement of flow volumes is due to the technical difficulties of determining how to produce flows that are "additive" to flows that would exist absent the VAs, the multiple circumstances in which one might count as "additive" water that would have been present as river flow or Delta outflow absent the VAs, the opportunities to later reduce flows in order to recoup "additive" flows, and other reasons as described above. Any such overestimation of flows would cascade into the subsequent modeling. As shown in Figure 5-2, the operations modeling feeds all the remaining modeling in support of the VAs.

IV. The claims in the Draft Supplement of "How VA flow actions are expected to help" are unsubstantiated.

The Draft Supplement presents no evidence that small increments of flow in the Bay-Delta and Sacramento River systems achieve substantial improvements in fish populations. Draft Supplement Table 2-1 overall appears to be founded on the notion that for flow, "more is better." The middle column of the table is labeled, "How VA flow actions are expected to help." The label is deceptive. A more accurate label would state: 'How increased flow generically provides benefits.' Supporting discussion later in the document reproduces this defect.

The Draft Supplement cites very few specific flow thresholds that achieve substantial improvements in fish survival overall or through specific life stages. When it does discuss such flow thresholds, the Draft Supplement does not say how often or for how long the VA flows will meet those thresholds.

An exception to the absence of stated thresholds is the discussion on page 6-21 of identified flow thresholds successful outmigration of juvenile salmon: "Perry et al. (2018) estimated the probability of survival of acoustic tagged late fall-run Chinook salmon from Freeport to Chipps Island to increase from just over 0.30 at ~7,000 cfs of Sacramento River inflow to 0.70 at over 75,000 cfs, with a particularly steep rate of increase up to ~35,000 cfs." Yet the Draft Supplement does not describe how many days, compared to existing conditions, the VA flows would achieve 7,000 cfs or 35,000 cfs or any value in between.

For Delta smelt and longfin smelt, the location of X2, and the duration of its location, are widely recognized as important determinants of survival. Yet there is no glimmer of discussion of how many miles west the VA flows would move X2 for how many days, compared to baseline. A useful metric might be how many days compared to baseline flow X2 was west of Collinsville.

Part of the problem for this analysis as well is that the Draft Supplement does not clearly describe the rules and mechanisms that would govern flows under the VAs. Not knowing how VA flows would be deployed, there is no way to determine how often VA flows would meet specific defined flow thresholds identified as improving survival or substantially increasing fish populations. Regarding X2, as an example, there is not even the outline of a strategy to improve its location, for example by augmenting uncaptured flow to extend its duration at a target location. Rather, the Draft Supplement chunks in a volume of water and describes the generic benefit of more water.

A likely explanation for the lack of this type of analysis is that the amount of flow promised in the VAs is adequate to meet these and similar flow targets only for a very short duration. A table in the comments of NRDC et al. performs some quantification.

V. The Draft Supplement does not analyze the role that drought and critically dry years play in suppressing fish populations, and the VAs propose no remedies.

The VAs propose virtually no changes to operations in dry year sequences and Critically Dry years. Droughts amplify and accelerate the declines of fish populations, attacking each freshwater lifestage. The immediate result for salmonids is pre-spawn mortality, poor or terrible egg-to-fry survival, and lack of outmigration success. The immediate result for smelt is extremely poor survival for all life stages due to a suite of factors.

The cumulative result of recurring droughts and accompanying low flows is declining stock of numerous key fish species. For a growing number of, there are no longer sufficient

adults reproducing to produce enough babies to restore populations in good flow years whose conditions favor juvenile survival. This is overwhelmingly true for Delta smelt, for which the annual abundance index since 2017 has been zero.[16]

One of the results of spiraling stock and recruitment is the lack of sufficient fish to use existing habitat. This is one reason the VAs' emphasis on creating physical habitat is so misguided: there aren't enough fish left in many cases to utilize the habitat that already exists.

The failure of the VAs to address sequential dry years and Critically Dry years is a glaring shortcoming in the VA proposals. The failure of the Draft Supplement to analyze the effects of sequential dry years and Critically Dry years on fish is a defect in the analysis of the performance of the VAs.

A. The Draft Supplement does not describe the extreme impacts of drought and Critically Dry years on fish populations, or consider these impacts in evaluating the ability of the VAs to achieve fisheries objectives.

An analysis of the escapement figures for winter-run Chinook salmon is illustrative of the spiraling decline of Central Valley fish stocks due to the cumulative catastrophic impacts of water management in droughts and dry year sequences. Because of the winter run's unique life cycle and geographic concentration almost exclusively in the Sacramento River downstream of Keswick Dam, as well as relatively small hatchery influence, winter-run escapement (return numbers of adult spawners) has limited confounding factors (such as straying).

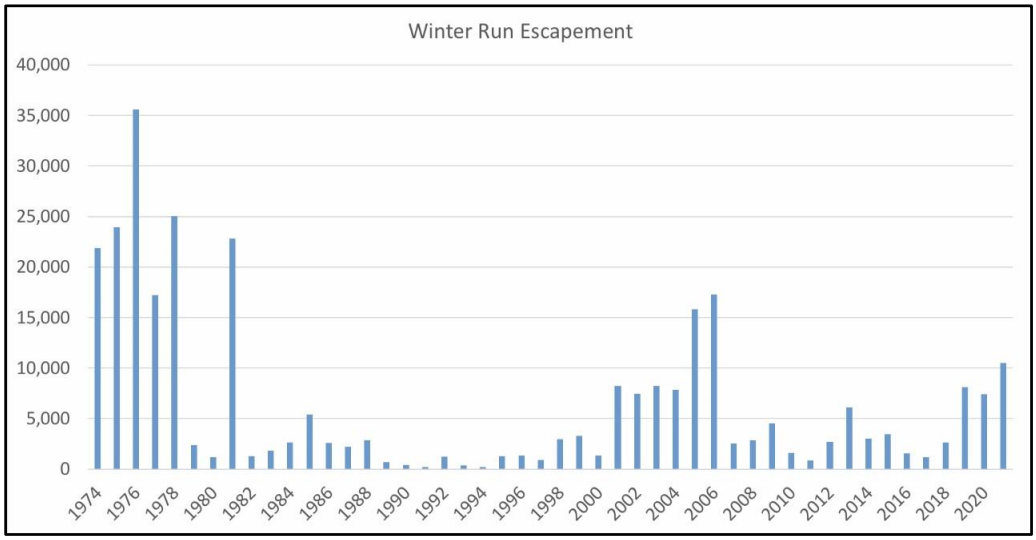

Figure 1: Winter-run Chinook salmon escapement 1974-2021. Source: GrandTab California Central Valley Chinook Escapement ...

[16] James White, California Department of Fish and Wildlife, "Memorandum, 2022 Fall Midwater Trawl annual fish abundance and distribution summary," (Dec. 29, 2022), available at: Memorandum: 2022 FMWT Annual Fish Abundance and Distribution.

Winter-run salmon generally return to the river to spawn as adults three years after they were spawned as eggs. Thus, the effects of droughts on escapement generally are evident three years after the year of spawning.

Figure 1 above shows that poor egg survival and/or poor success of juvenile outmigrants during the 1976-1977 drought resulted in low escapement in 1979 and 1980. Critically Dry conditions in 1987 led to very low escapement in 1990. Escapement three years following each of the subsequent drought years in the 1987-1992 drought was also very low.

The very wet year 1995 still showed poor escapement due to spawning and outmigration conditions in drought year 1992. Even in 1998, a very wet year whose cohort was spawned in wet year 1995, escapement showed very limited recovery. It took two additional cohorts (minimum six years) before escapement rebounded to exceed 10,000 adults.

The pattern repeats three years following drought years 2007-2009 and 2013-2015. In particular, escapement in 2017 and 2018, spawned in 2014 and 2015, was extremely depressed.

Note that the limited recovery or partial rebound of escapement exhibits an overall downward trend. The 'good' years have become progressively less good. If sequential dry or Critically Dry years increase in frequency, as has occurred since 2007 and as is widely predicted, the opportunities for even modest recovery in escapement appear limited.

The Draft Supplement does not account for the oversize impacts of droughts on native fishes, in particular in the context of the severe declines of wild salmon and smelt over the past three decades. A revised Supplement should add this analysis, particularly in the context of the ability of the VAs to achieve fisheries objectives.

B. The Draft Supplement does not analyze the VAs' apparent continued reliance on the serial use of TUCPs and inadequate water temperature management in dry year sequences, and the resulting ability or inability of the VAs to achieve objectives for salmon, pelagic species, and water quality (including water temperatures).

In the last decade, the managers of the SWP and CVP have serially applied for Temporary Urgency Change Petitions (TUCPs) for the operation of the Delta during dry year sequences (2014-2016; 2021-2022). This is catalogued on a Board webpage.[17] Additionally, the Bureau of Reclamation, most disastrously in 2014, 2015, and 2021, has sought and received Board approval for Sacramento River Temperature Management Plans that, combined with operations of the CVP's Shasta and Trinity River divisions, have resulted in massive mortality of Sacramento River winter-run and fall-run Chinook salmon.

[17] *See* https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/tucp/index.html.

The failure of water management that does not plan for droughts, but rather reacts on a year-by-year by weakening environmental protections, is broadly recognized as dysfunctional. The 2018 Framework explicitly requires any VA to address droughts: "To avoid redirected impacts … caused by implementation of the voluntary plans, the proposed program of implementation would also require that the plans provide for … measures to plan for and effectively protect aquatic beneficial uses during sustained dry conditions, including droughts..."[18]

The total silence of the VA Term Sheet on droughts, including the almost complete absence of additional flow in Critically Dry water years and, as discussed below, the absence of reservoir carryover requirements in the VA package, suggests that the VA proponents support defaulting to the existing unworkable and unacceptable reliance on TUCPs and lethal water temperature conditions during dry year sequences. The Draft Supplement fails to analyze the consequences of such reliance in terms of the ability or inability of the VAs to achieve fishery objectives. A revised Supplement should add this analysis.

C. The Draft Supplement does not analyze the need for carryover storage in reservoirs to mitigate water temperatures and low flow impacts, and the VAs do not propose carryover requirements.

Consistent with the VAs, the Draft Supplement is silent on carryover storage. Carryover storage requirements for major reservoirs are assumed in the 2018 Framework as part of an overarching narrative objective:

> *Maintain stream flows and reservoir storage conditions on Sacramento River/Delta tributaries to protect cold water habitat for sensitive native fish species, including Chinook salmon, steelhead, and sturgeon. Cold water habitat conditions to be protected include maintaining sufficient quantities of habitat with suitable temperatures on streams to support passage, holding, spawning, incubation, and rearing while preventing stranding and dewatering due to flow fluctuations.*[19]

Similarly, the implementation of The ("Phase 1") Revised Water Quality Control Plan, Lower San Joaquin River flows is already contemplating specific carryover storage requirements for New Melones, Don Pedro, and McClure reservoirs.[20]

In both the VA Term Sheet and the Draft Supplement, these considerations are nowhere to be found. As recognized in the proposed objective in the 2018 Framework as cited above, reservoir storage is an essential element in water temperature management. In fact, carryover

[18] 2018 Framework, p. 25.
[19] 2018 Framework, p. 16.
[20] *See* Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for a "Proposed Regulation to Implement Lower San Joaquin River Flows and Southern Delta Salinity Objectives in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta." Available at: https://www.waterboards.ca.gov/public_notices/notices/revised_notice_ceqa_baydelta_nop.pdf

storage, combined with reduced water deliveries, is one of the few available management tools to mitigate the impacts of thermal impairment, low flows, and fall flow reductions (and resulting redd dewatering) in the salmon holding and spawning reaches downstream of reservoirs during Critically Dry years and dry year sequences.

Recent experience during Critically Dry years and dry year sequences has borne this out. Inadequate storage and associated inadequate availability of cold water in Shasta Reservoir in 2014, 2015, 2021, and 2022 led to massive failure of egg-fry survival.[21] Inadequate storage in Folsom Reservoir in 2014 and 2015 led to gross exceedances of lethal water temperatures for steelhead and salmon, and large-scale redd dewatering, in 2015.

The 2017 Scientific Basis Report discusses water temperatures and their importance to salmon fairly extensively.[22] Chapter 4 of the 2017 Report also analyzes the importance of water temperatures for Delta smelt and longfin smelt and other species.

However, the Draft Supplement fails to supplement the 2017 analysis with discussion of how the VAs would improve water temperature impairment. A revised Supplement should be explicit and clear about whether the VAs propose to maintain the above-cited cold-water-habitat narrative objective from the 2018 Framework, or similar, and about whether (and if so how) the VAs would operate reservoirs and/or take other measures to meet that objective.

VI. Conclusion

The Board should require clarification of the VAs to a point sufficient to allow analysis of the flow measures the VAs propose, and should incorporate such analysis into a revised Supplement. The Board should revise the Supplement to analyze whether and how the proposed VA flows benefit fish. The Board should revise the Supplement to analyze how the VA flows perform in providing purported benefits due to the effects of droughts and dry year sequences.

Thank you for the opportunity to comment.

Respectfully submitted,

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[21] The 2017 Scientific Basis Report acknowledges extremely low egg-to-fry survival in 2014 and 2015 on p. 3-36.
[22] Id., pp. 3-20 to p. 3-36.

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