United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Southwest Region
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Sacramento, CA 95825-1846

March 15, 2017

Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA

Subject: U.S. Fish and Wildlife Service comments on the Revised Draft 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

Dear Ms. Townsend,

The US Fish and Wildlife Service (Service) has reviewed the State Water Resources Control Board's (Board) *Public Draft Revised 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* (SED), released September 15, 2016. Service staff that participated in this review were encouraged to find the exhaustive review of pertinent literature and considerations for more uniform and balanced flow objectives that may benefit multiple species and their habitats. The Service appreciates the opportunity to review the draft revised SED and the Board's continued efforts to better balance the complex set of needs and benefits related to the multiple potential uses of water throughout the Central Valley.

The Service is responsible for administration of the Endangered Species Act of 1973 (ESA), as amended [16 U.S.C. 1531 et seq.] for non-anadromous fish and other listed aquatic species, co-administers the Central Valley Project Improvement Act (CVPIA) and San Joaquin River Restoration Program (SJRRP) with the US Bureau of Reclamation and works with multiple partners in sampling, assessing and managing fish populations, habitat conditions and water operations through the Interagency Ecological Program (IEP).

The following is a summary of the main issues identified by the Service during the review of the draft revised SED. Additional detailed comments and supporting materials are enclosed.

Fish and Aquatic Habitat Flow-related Needs

Salmonids – Limited total in-river flow and significantly altered annual hydrographs have long been identified by Federal and State agencies and others as a primary contributor to the significant declines in Chinook Salmon and steelhead populations throughout the San Joaquin River watershed and southern Delta. Based on our review of the draft revised SED and previous analyses, the Service believes the proposed unimpaired flow (UF) standards (30-50% UF range,

with a starting point of 40%) will provide an overall modest improvement from current conditions for salmonid populations the San Joaquin River and tributaries. However, previous estimates suggest that UF percentages on the higher end of that range in many years, and above 50% in some years are needed to make significant progress toward the SED Salmon Protection Objective (which is based on the CVPIA Doubling Goal). The Service recommends that additional guidance be provided in the draft revised SED to the Stanislaus-Tuolumne-Merced (STM) working group that speaks to these concerns and emphasizes the need for strong consideration of potential negative impacts to fish populations related to any UF proposals below 40% of significant duration during time periods when large numbers of juveniles are present in the system. The Service also recommends that the draft revised SED contain additional detail and emphasis related to coordination with the San Joaquin River Restoration Program (SJRRP). Additional flows from the upper San Joaquin River, increased diversions of those flows in the lower San Joaquin River and the reintroduction of spring-run Chinook Salmon, as part of SJRRP, will certainly have an impact on future conditions and species needs in the lower river and tributaries and consideration of these changes in the larger system in the future are imperative to future decision making and assessments. The Service is not recommending that current or future SJRRP restoration flow and fish reintroduction plans be directly included in the revised draft SED, rather that they are acknowledged more directly and guidance be provided that they must be considered in future planning efforts and UF proposals to achieve success throughout the San Joaquin Basin.

White Sturgeon – The Service has been a leading force in recent collaborative efforts to locate and track White Sturgeon in the San Joaquin River and south Delta, document and characterize migration patterns and spawning behavior and identify current and potential future sturgeon habitat within the system. This work had resulted in fundamental changes to the understanding of sturgeon presence and activity in the San Joaquin River. Our work has shown that White Sturgeon not only commonly occur in the San Joaquin River in all water year types but may actively spawn in wet years and drier years when cued by relatively modest and short-duration flow increases. The Service recommends that summaries and consideration of these recent findings be added to the draft revised SED along with improved guidance related to the consideration of additional fish species that may be impacted by UF proposals.

Impacts of Flow-shaping – As part of the Service review of the draft revised SED, We compared historical hydrographs to 40% of UF (1- day and 7-day average) for the Stanislaus, Tuolumne, and Merced rivers where daily data was available for UF (start of period by tributary: 1998-Tuolumne, 2000-Merced and 2002 Stanislaus) in the January to June period (enclosure 1). We developed a spreadsheet tool that we will share with the Board and stakeholders if desired for viewing individual years of data in each tributary. For all three tributaries, the shape and volume of available water appeared to be slightly (Stanislaus) or much (Tuolumne and Merced) better under a 40% UF condition than under the current hydrograph. We found several issues worth identifying to the Board. 1) Desirable variability (pulse magnitude) in many years was substantially reduced when a 7-day average was applied and this averaging is also likely to disconnect the releases from other environmental factors (e.g. cloud cover, turbidity, barometric pressure) that are known to influence fish behavior. 2) Averaging over 7 days can also greatly reduce the occurrence of fluvial flows which are important in mobilizing gravel and keeping spawning and macroinvertebrate producing substrates free of fine sediments. 3) According to CDEC, there are many days (and even sustained periods) where the calculated Full Natural Flow from CDEC is zero or negative, especially in January and sometimes February and mostly in the Tuolumne and Merced rivers. Any % UF schedule based on these values will result in no water in the river during a time when fall-run Chinook salmon eggs are incubating and fry are beginning to emerge. A simple solution is to implement a minimum flow threshold rather than trying to

forecast precipitation and allocation in real-time, since operational constraints and flood capacity will already dictate maximum flow thresholds. The Service recognizes the significant positive change from a 14-day running average in the initial draft SED to a 7-day running average in the revised draft SED. However, we recommend that guidance emphasizing the strong desire and potential benefits of attempting to achieve even shorter delays in releasing flows during and immediately following storm events that more closely mimic a natural hydrograph be included in the revised draft SED.

Adaptive Management

General – The Service values the desire to adaptively manage flows and the flexibility that is provided to the STM working group in the revised draft SED. However, relying on the STM working group to further develop specific goals and measureable objectives related to flow management is a concern. The Service recommends additional development of the adaptive management process and the inclusion of a more detailed adaptive management framework in the revised draft SED.

Goals and Objectives – Well defined and measureable goals and objectives are the foundation upon which any successful adaptive management effort relies. Describing and modeling current condition, identifying stressors and potential management actions, predicting outcomes of alternative actions or impacts, developing robust and meaningful monitoring plans, analyzing and synthesizing results, iterative and informed decision making and ultimately tracking success all rely on the ability to define and measure goals and objectives. The Service recommends developing a numeric Salmon Protective Objective, which can be achieved by utilizing the numeric CVPIA doubling goal for each of the San Joaquin River tributaries (USFWS 2001).

The CVPIA doubling goal as described in the Final Restoration Plan for the Anadromous Fish Restoration Program (2001) provides numeric goals for fall-run Chinook Salmon for each of the San Joaquin tributaries. To better support these goals, the Service recommends developing objectives for intermediate life stages (e.g. egg, fry, smolt) that fall under the jurisdiction of the Board's regulatory authority. The Scientific Evaluation Process (SEP) Group formed from the early San Joaquin Accord meetings has developed a comprehensive report (Conservation Planning Foundation for Restoring Chinook and O. mykiss in the Stanislaus River) documenting both the physical characteristics necessary to support recovered salmonid populations, and interim life-stage biological objectives necessary to achieve the doubling goal. Without these objectives, it is nearly impossible to evaluate progress under an adaptive management framework due to the delay in results from the time necessary for outmigrating salmon to return as adults. In addition, the Board should develop (with appropriate partners) similar objectives for the suite of native aquatic species affected by the SED, especially those that state or federally listed, proposed for listing, or are highly invasive (e.g. Asian clams, Egeria).

Resources – The Service strongly supports the reliance on adaptive management, including the formation of the STM working group found in the revised draft SED. Our staff looks forward to being active in, and supporting this process. Our greatest concern related to implementation via adaptive management as it is currently described in the revised draft SED relates to the limited amount of guidance and structure that is provided. To be successful, this process will require a significant commitment of resources. The Service recommends a more robust and complete adaptive management framework is included in the revised draft SED. The framework should include more detail regarding the roles and responsibilities of working group representatives, governance and the decision-making processes the working group will operate under, finite biological goals that the working group should prioritize and specific areas of limitation that the

working-group will need to consider in crafting flow proposals.

The revised draft SED sets a 180-day target for the STM working group to develop, and the Board to consider approval of biological objectives. The Service feels this is an ambitious, yet likely unachievable timeline. Working with Reclamation and other partners, the Service has been involved in a similar effort to set biological goals and objectives related to our implementation of the fisheries and water provisions of CVPIA. Also similar to what is described in the revised draft SED, partners in the CVPIA process have been working to define a robust adaptive management framework and simultaneously develop biological goals and objectives. This process has taken well over 2 years and required substantially more directed resources and funding from the Service and Reclamation that anticipated, as well as commitment and in-kind resources from our partners. Based on these efforts, the Service recommends inclusion of a more detailed adaptive management framework in the revised draft SED and less reliance on the STM working group to develop the general structure and process they will operate under.

A substantial amount of real-time and long-term monitoring will also be required to successfully implement via adaptive management. A substantial amount of historic data and ongoing additional data collection already exist that will likely be useful for these efforts, but it is collected by multiple entities for various different reasons and accessibility to the data varies widely. Additional monitoring needs will undoubtedly be identified during the formation and ongoing activities of the STM working group as well. The Service recommends the development and inclusion of a monitoring and assessment plan in the revised draft SED. This plan should identify how existing data sources will be leveraged and obtained, how additional monitoring needs will be developed and prioritized, how information will be utilized and how these efforts will be coordinated and funded.

The Service thanks the Board for your extensive efforts in producing the revised draft SED and for the opportunity to review. We look forward to continue working closely with the Board, Board Staff and additional stakeholders in the further development and implementation of the Bay-Delta Plan. If you have any questions related to this correspondence or if the Service can provide any additional assistance, please contact Donnie Ratcliff, Central Valley Supervisor – Fish and Aquatic Conservation at (916) 414-6599 or via email at donald_ratcliff@fws.gov.

Literature Cited:

US Fish and Wildlife Service (USFWS). 2001, Final Restoration Plan for the Anadromous Fish Restoration Program: A Plan to Increase Natural Production of Anadromous Fish in the Central Valley of California.

Enclosures:

1. Summary of Stanislaus, Tuolumne and Merced River actual vs. 40% UF analysis
2. White Sturgeon documented spawning events related to San Joaquin River flow
3. Specific comments from USFWS Staff review of revised draft SED (Phase 1)

Enclosure 1. Summary of Stanislaus, Tuolumne and Merced River actual vs. 40% UF analysis

Background: As part of the US Fish and Wildlife Service's (Service) review of the draft revised SED, We compared historical hydrographs to 40% of UF (at 1-day and 7-day averaging periods) for the Stanislaus, Tuolumne, and Merced rivers where daily data was available for UF (start of period by tributary: 1998-Tuolumne, 2000-Merced and 2002 Stanislaus) in the January to June period. We developed a spreadsheet tool that we will share with the Board, STM working group and stakeholders if desired for viewing individual years of data in each tributary. The following is a summary of some of the general findings by Service staff based on initial review and assessment of recent conditions and several potential flow scenarios for the 1998-2016 period.

- Release volumes would be higher in many years with a 40% UF volume released (Table 1).
- In many years with large amounts of precipitation (measured in total volume, number of events, or both) there have been substantial reductions in the overall flow released and the number of precipitation events that show a response in downstream releases. Further, the longer the UF averaging period, the more decoupled managed releases become from natural storm events (Figure 1).*
- There have been several instances where large-scale flow events have not yielded any significant change in releases during the Feb-Jun time period and in some cases may be artificially truncating the season during which river conditions are conducive to native fish (Figure 2).*
- Conversely, there are instances where strictly following an UF schedule would yields lower flows than what was actually released, and those may be at levels that would be catastrophic to fish and aquatic resources (Figure 3).*
- Finally, shorter-time scale ability to release flows aligned with natural storm events can have significant impacts related to the timing and spatial extent of desirable floodplain habitat activation and the duration of inundation (Figure 4).*

* Note – The %UF rates included in Figures 1-4 are provided for example purposes only. The Service is not attempting to propose or recommend any specific %UF rates by including these example figures in this submission.

Table 1. Summary of 40% UF volumes compared to actual volumes released from 2002-2016, February through June. (*)Volume = 40%UF volume/actual release volume.

Year	Volume *		
	Stanislaus	Tuolumne	Merced
2002	1.4	4.8	1.9
2003	1.4	4.8	2.1
2004	1.5	2.5	1.5
2005	3.2	0.9	1.1
2006	0.6	0.6	0.6
2007	0.6	2.5	1
2008	1	3.8	1.4
2009	2	5.9	2.8
2010	1.8	1.5	2.8
2011	1.5	0.6	0.6
2012	0.7	2.4	1.4
2013	0.6	4.2	1.6
2014	0.5	3.5	1.2
2015	1	2.8	1
2016	1.7	6.7	4.5
Average	1.3	3.16	1.7

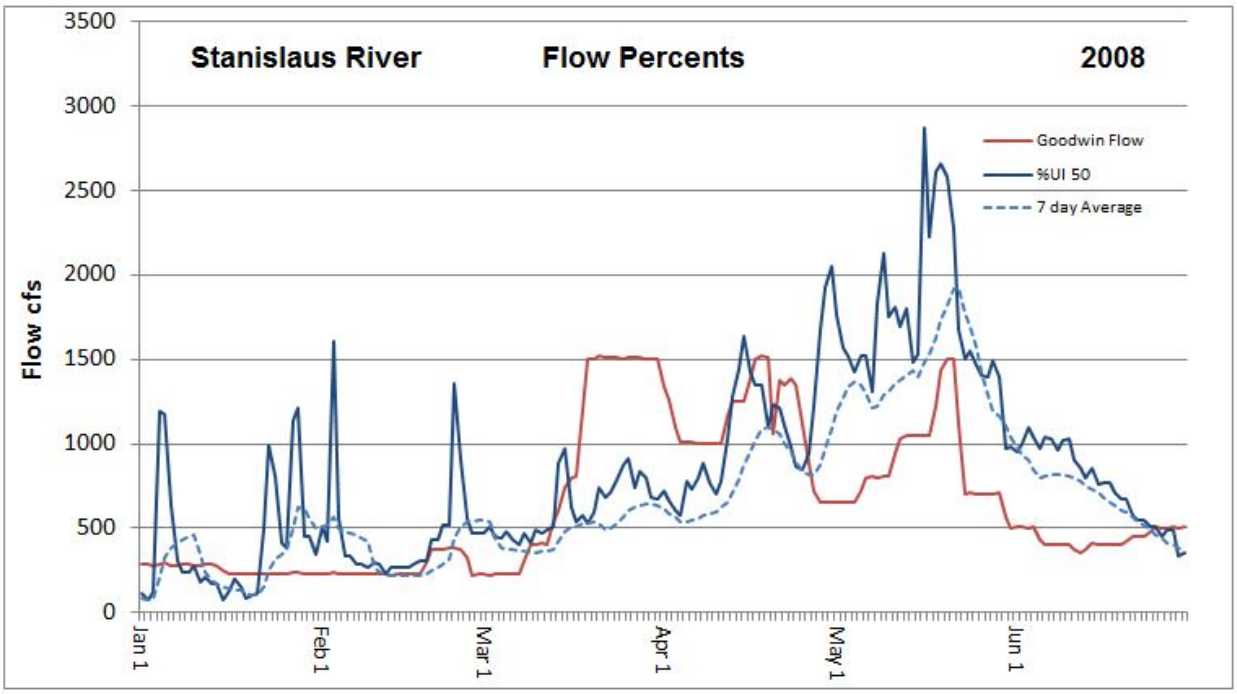

Figure 1. Actual and modeled releases during January-June 2008, Stanislaus River. Red line depicts actual flow below Goodwin Dam, solid blue line represents instantaneous 50% UF releases and dashed blue line represents 50% UF based on 7-day running average.

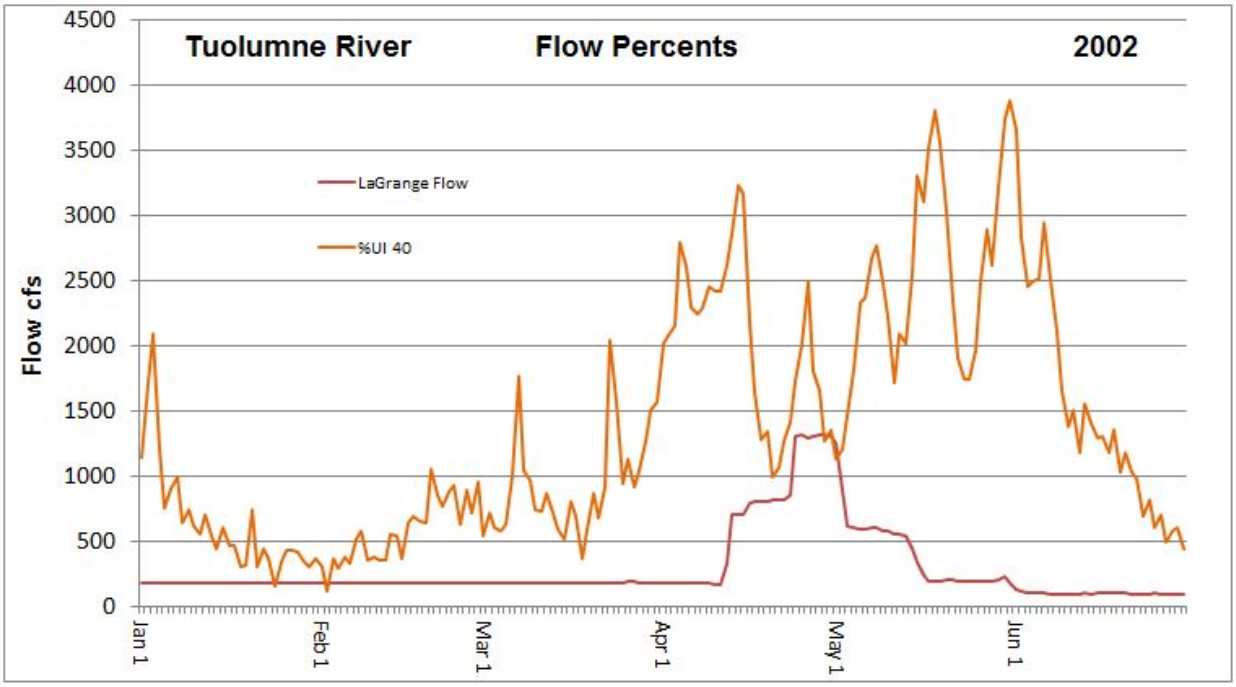

Figure 2. Actual and modeled releases during January-June 2002, Tuolumne River. Red line depicts actual flow below La Grange Dam, orange line represents instantaneous 40% UF releases.

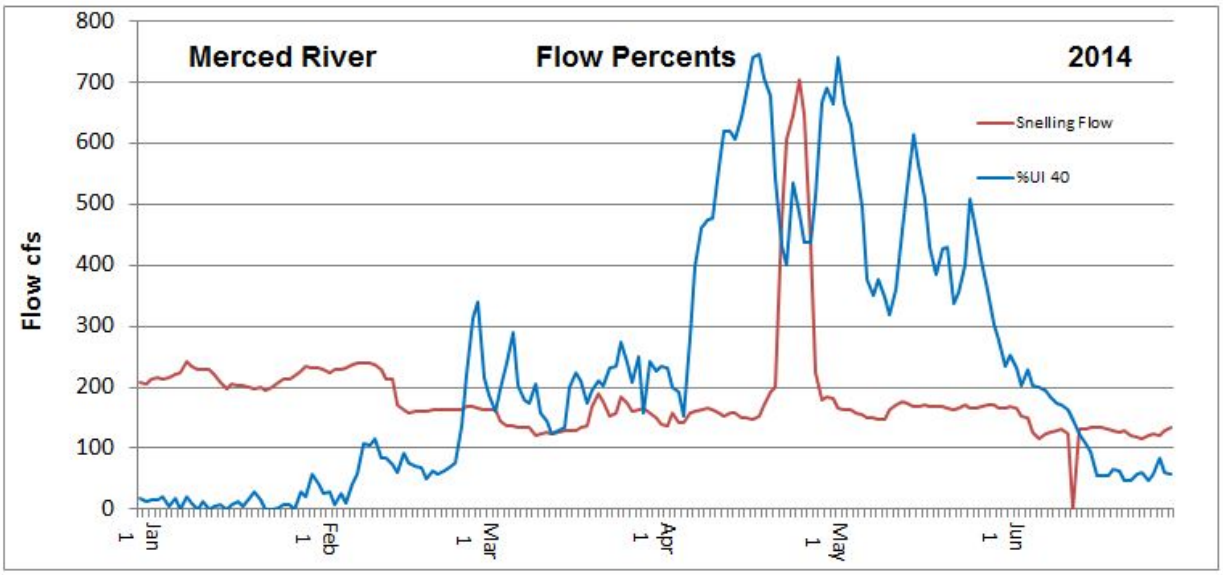

Figure 3. Actual and modeled releases during January-June 2014, Merced River. Red line depicts actual flow below measured at Snelling, CA, blue line represents instantaneous 40% UF releases.

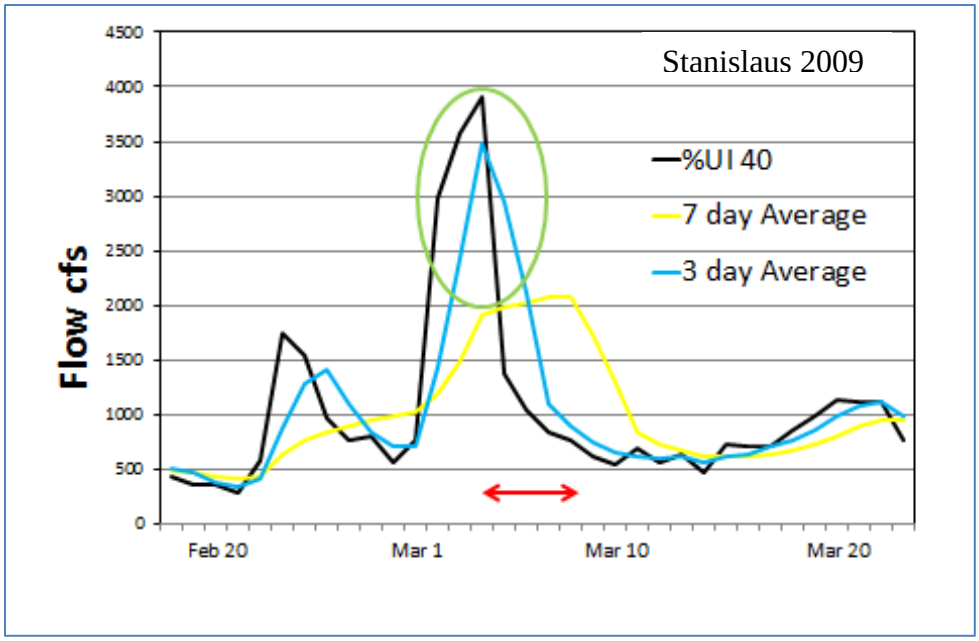

Figure 4. Modeled releases from mid-February through March 2009, Stanislaus River. Black line depicts instantaneous 40% UF release, blue line represents instantaneous 3-day running average at 40% UF releases and yellow line represents 7-day running average at 40% UF releases. The area in the green oval represents flow peaks that matched the timing and increased the overall volume of a natural runoff event. Red arrow at the bottom of the chart represents the temporal shift in the limited flow increase that is caused by utilizing a straight 7-day running average.

Enclosure 2. White Sturgeon documented spawning events related to San Joaquin River flow

Background: The Service has been conducting research and assessments on White Sturgeon occupancy, behavior, habitat use and habitat prevalence in the mainstem San Joaquin River and the lower sections of the associated tributaries since 2011. We have successfully documented occupancy, migration, spawning and juvenile recruitment on multiple occasions in the last 5 years of sampling. Notably we have found that:

1. White Sturgeon adults occur in the mainstem San Joaquin every year,
2. Successful spawning may be cued with **modest flow increases**, even in relatively dry years (Figures 5,6),
3. Higher overall spring flow levels in the San Joaquin, Stanislaus, Tuolumne and Merced rivers are likely to equate to more successful years of White Sturgeon spawning and juvenile recruitment

Stanislaus 2009

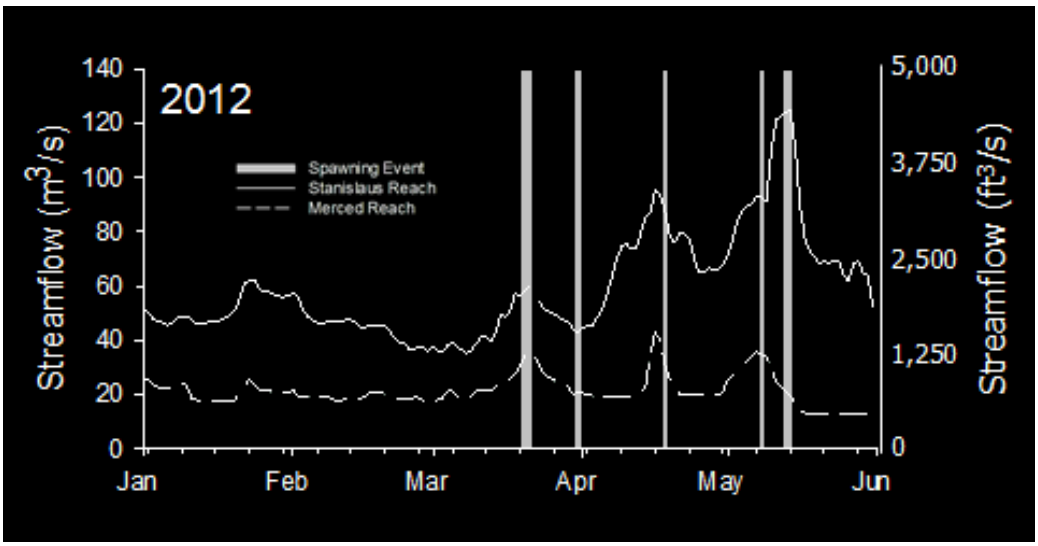

Figure 5. Documented White Sturgeon spawning events in the mainstem San Joaquin River (SJR), 2012. Spawning was documented by successful capture of White Sturgeon eggs, from which an estimated date of spawning was calculated. The solid white line indicates SJR flow below the Stanislaus River confluence and the dashed white line indicates SJR flow below the Merced River confluence. Vertical bars indicate calculated spawning periods based on age of collected White Sturgeon eggs.

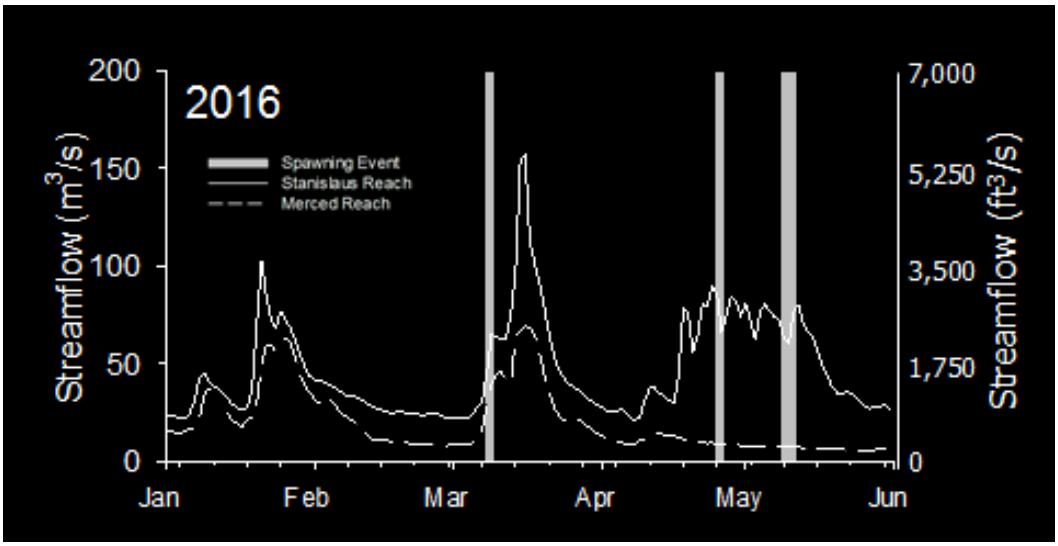

Figure 6. Documented White Sturgeon spawning events in the mainstem SJR, 2016. Spawning was documented by successful capture of White Sturgeon eggs, from which an estimated date of spawning was calculated. The solid white line indicates SJR flow below the Stanislaus River confluence and the dashed white line indicates SJR flow below the Merced River confluence. Vertical bars indicate calculated spawning periods based on age of collected White Sturgeon eggs.

Enclosure 3. Specific comments from USFWS Staff review of revised draft SED (Phase 1)

US Fish and Wildlife Service - Full Staff Review Comments, Phase 1 SED		
Page	Section/Subject	Comment
General		
N/A - General	Modeling Approach	The SED is intended to document the potential effects of proposed actions. Many benefits are ascribed to using a percentage of a 7-day running average of unimpaired flow into a tributary's major reservoir (e.g., New Melones) to set minimum instream flow requirements at the mouth of the tributary (e.g., DWR's Koetitz Ranch gage). What is proposed could have been more directly modeled. Most of the effects (redd scour, redd dewatering, stranding, floodplain utilization, pushing out of salmonid fry and smolts, etc.) are clearly sub-monthly phenomena which occasionally extend past a month in duration. The effects analyses (and therefore the modeling) would more appropriately be done on a shorter time scale, e.g., daily or weekly, not on a monthly time scale.
N/A - General	Modeling Approach	The modeling uses perfect foresight of reservoir inflow from March through September which is clearly at odds with the real world practice (at least on the Stanislaus) of using very dry (90 pct exceedance) estimates of coming hydrology. The modeling uses perfect foresight of Feb-Jun unimpaired flow. SED Appendix F.1 atop page F.1-4 suggests the modeling allocation logic uses that perfect foresight (in the form of corresponding minimum springtime flow requirements). Consequently, actual allocations should not be expected to be as high as modelled allocations. The potentially significant impact of uncertainty and it's interplay with the timing of securing loans/planting, etc. appears to be significantly flawed in the SED's water modeling. The modeling argument that mis-representations are okay if they're in both simulations being compared is being applied incorrectly here because the level of uncertainty differs with each alternative. The modeled approach likely leads to overly optimistic allocations to water districts in early spring.
Executive Summary		
ES-1	4th paragraph	How was "unreasonable negative effects on water supply for agriculture, drinking water, hydropower and other competing beneficial uses" determined. Is it possible to be protective enough of the fish and wildlife resources, without causing "unreasonable negative effects" on water supply. Perhaps not, but this assumption/assertion needs to be quantified and spelled out here
ES-2	2nd bullet	Not clear what "increase salinity objectives.." means – does that mean higher salinity standards or lower salinity standards, " while generally maintaining existing conditions" - how can salinity objectives be increased, but existing conditions are maintained. The statement is confusing as written.
ES-4	1st paragraph	How was it determined what was reasonable for the protection of fish and wildlife beneficial uses. Even though the proposed flows are higher than the existing flow requirement in some cases, how would one know that it's protective level is reasonable (high enough) to meet the goals (on page ES-9; bullet 1) of maintaining inflow conditions from the SJR Watershed sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta and to provide flows in quantity necessary to achieve functions essential to native fishes (on page ES-9; bullet 3).
ES-8	Section ES4.1, 2nd bullet	Many wouldn't see that "providing a more reliable water supply for California" is the same as avoiding "..unreasonable negative effects.." Perhaps much less water for agriculture is necessary for assuring a more reliable supply. Possibly change wording here to be more reflective of the need to balance water supply needs with negative effects to other beneficial uses.

ES-8	section ES-4.1, 3rd bullet	If the 2010 report determined that 60 percent of unimpaired SJR inflow from February-June would preserve the attributes of a natural variable system and that flow requirements should reflect the frequency, duration, timing and rate of change of flows, how can something lower be proposed (30 to 50 percent of unimpaired flows) and expect to protect the fish at a reasonable level. If the fish and wildlife beneficial uses need these values of flow to reach threshold effects, it is unclear how they would be impacted from providing less than what was determined they fully need.
ES-9	2nd bullet	Other stresses of nonnative species, predation, and high water temperatures are all related to flow which was discussed in the previous paragraph. This paragraph implies that these other stressors are independent of flows, which they are not.
ES-10	Section ES-4.2, 3rd bullet	We do not believe that it is clear that the operational barriers likely won't be built because of the endangered species concerns. Is this an assumption rather than a forgone conclusion? If so, please clarify the language
ES-11	Section ES5.1, 1st paragraph	It is not clear how it was determined that an unimpaired flow of 30 to 50 percent is sufficient to reasonably protect fish and wildlife beneficial uses. It is stated that the numeric range provides maximum flexibility to achieve the narrative element of the flow objective of "sufficiently supporting and maintaining viable native migratory San Joaquin River fish populations.." It is not clear that is does and we recommend including a summary of how that conclusion was reached in the executive summary.
ES-12	2nd paragraph	Minimum base flows of between 800 – 1200 cfs at Vernalis from February – June, does not appear to be fully protective. Only when the base flows would exceed 100% of the unimpaired flow would it be intuitively protective
ES-12	1st bullet	It is not intuitive that expressing the objective as a number range achieves the goal in the first bullet. It is not clear that 30 to 50 percent of inflow is adequate to support and maintain the natural production of viable native SJR Watershed fish population migrating through the Delta.
ES-12		Ranges provided as minimums usually default to the lowest value in the range unless otherwise specified. A stronger set of criteria and considerations related to how decisions to change instream flow percentages would be developed and assessed needs to be included before we feel confident that lower values will become the norm.
ES-12	3rd bullet	It is not clear how you could reduce unimpaired flows to a lower level and not significantly reduce the benefits to fish and wildlife.
ES-13	last bullet	Allocating 40 percent of the unimpaired flow to fish and wildlife beneficial uses and more (60 percent) to others is not intuitively equitable. Why should the fish and wildlife beneficial uses get less than the others? Langauge related to need to balance between uses and accepting lesser benefits for some categories may help explain this more clearly.
ES-15	1st paragraph and ES16, 2nd paragraph	There seems to be a discrepancy between the two paragraphs about what the starting point is. Page ES15 says it is 60 percent, ES16 says its 50 percent. Please reconcile the two.
ES-16	last paragraph	How can best available scientific information support changes "..sufficient to support and maintain the natural production of the viable native fish LSJR fish populations migrating through the Delta.." if "sufficient" has not been defined?
ES-17		Shifting flows for temperature benefits outside the Feb-Jun range presupposes no need for flow regulation outside that period. Fall attraction flows (which may also be employed to address early fall temperature concerns) appear to be completely absent from consideration here.

ES-18	2nd paragraph	It's not clear how you can demonstrate reasonable protection if goals are not established until later through the program of implementation. Perhaps we will find that what we have considered reasonable (30 to 50 percent of unimpaired flows), does not meet the established goals for what reasonable protection is. It seems like the determination of what reasonable protection is, was determined without knowing what level of protection those flows would provide. Seems backwards- it would be better to identify what you are trying to achieve biologically first, prior to determining what flows are needed to sustain and maintain those levels. Biological goals should also incorporate survival. The other biological goals listed will be difficult to relate to specific flow levels and be isolated from other influences through-out the salmonid life-cycle.
ES-18	first bullet	Biological goals alone cannot be used to evaluate the effectiveness of the program of implementation – there has to be an adequate level of monitoring that measures the biological goals and relates it to the actions in the program of implementation? What will be used as a control to determine the effectiveness of the program under the program of implementation, unless the same biological metrics are measured prior to the program of implementation in similar types of years?
ES-19	Non-flow actions, 1st paragraph	The last sentence seems to imply that only minimal flows are "needed to reasonably protect fish and wildlife beneficial uses in the LSJR..", which we do not believe is true. We have minimal flows now, and they are not adequately or reasonably protecting fish and wildlife beneficial uses.
ES-19		Temporary Urgency Change Petitions have been utilized frequently in the Central Valley in recent years and can have potentially significant additional negative impacts related to environmental protections in the face of limited water. They should somehow be considered here.
ES-19	Non-flow actions, 2nd paragraph	these other factors are also related to flows. It is unlikely that there are any other measures that can address these factors, that don't incorporate flow, because they are created by the lack of flow and are related to flow (with the possible exception of barriers). This paragraph implies they are separate from flow and they are not. It is unclear how monitoring and adaptive implementation, of themselves, will improve habitat conditions or how reducing the flows will achieve reasonable fish and wildlife protection goals.
ES-21	Section ES5.3, 1st paragraph	What level of protection is expected from this LSJR alternative 3, relative to the other alternatives?
ES-22	Last sentence	"Water supply" appears to be "reflective of both the availability of, and demand for, water" here. It seems like "water supply" should only reflect how much is available, and not incorporate the demand. Perhaps a new term would be better.
ES-25		Is the SWRCB staff aware of recent analyses by Joel Herr, of Systech Water Resources, Inc., who has analyzed data that suggests seepage loss to groundwater is occurring in the river? "In the 1990's groundwater accretions were estimated to provide over 600 cfs of flow to the San Joaquin River, but since then there has been a persistent downward trend leading to approximately zero net groundwater accretions in 2015 and net seepage loss from the river in 2016. A continuation of this trend may result in sections of the river running dry with increasing frequency. " from Abstract Book, 2016 Science Meeting, San Joaquin River Restoration Program, session three, page 15.
ES-43	Temperature Benefits	The estimates of benefits to water temperature from flow do not appear to include the potential warmer effect from climate change and reduced precipitation.
ES-44	Temperature Benefits	Temperature benefits would also be derived from 60 percent of unimpaired flow
ES-44		It's not been shown that Yolo bypass flooding actually increases survival in Yolo Bypass (manuscript in review). Provide references that show it does increase survival or clarify what can be said based on existing published literature vs. what is being implied/assumed.
ES-46		Many experts would argue that flows in Feb-Mar are not "relatively high" in the baseline condition.

ES-46		Why isn't floodplain inundation under 60 percent of unimpaired flow included here as well?
ES-47		The benefits of floodplain inundation in later spring months (May and June), must be offset by the potential use by warm water predators. By May and June many of the salmon may be gone from the tributaries, especially in drier, warmer years.
ES-54		The HORB should only be constructed if there are adequate flows (above 2500 cfs and below 7000 cfs). Recent evidence suggests (Brandes, personal communication) it is not helpful to the survival of Chinook salmon in low flow years because the fish do not survive in the San Joaquin River downstream of the barrier in these years.
ES-55		It's hard to know the impact relative to the benefit of "small scale and large scale applications of herbicides" for aquatic weed control. More flow would likely reduce the proliferative spread of submerged aquatic weeds.
ES-57		Table ES-23 - The Impacts determined for various types of restoration seem to be larger than those we find for our projects.
Chapter 1		
1-1		The Board should consider whether additional tributaries to the Lower San Joaquin River (e.g. Kings, Fresno, & Chowchilla Rivers) should be included in the plan area.
1-2	1.2	The San Joaquin River upstream of the Merced River confluence should be included in the SED based on their management affecting each other. If this area is excluded from the SED for legal reasons, these reasons should be stated in the Introduction Section. The San Joaquin River upstream of the Merced River confluence will be connected to the LSJR prior to 2022, which could influence Vernalis flows (e.g., compliance with minimum base flow target of 1,200cfs) and overall water quality.
1-11	1.5.2	Would the export regimes be modified at the SWP and CVP facilities to facilitate the estimated biological benefit(s) of the LSJR and SDWQ alternatives regarding migratory (e.g., anadromous) fish species? For example, the biological benefit of LSJR alternatives may not be observed or detected if species of concern are being impacted by SWP and CVP operations.
Chapter 2		
2-19	Section 2.4.2; Table 2-10	Recommend adding an additional column header that shows percent (%) of unimpaired flow, per each water supply/use
2-20	Section 2.4.2; Table 2-11	Recommend adding an additional column header that shows percent (%) of unimpaired flow, per each water supply/use
2-22	Section 2.4.3; Table 2-13	Recommend adding an additional column header that shows the *estimated* percent (%) of unimpaired flow, per each streamflow requirement period, under normal or dry year conditions
2-22	Section 2.4.4; 2nd paragraph; last sentence	Illustrates the need for flow adjustment during winter and spring for the protection of fall-run chinook salmon, as this is a critical time period for juvenile survival in the Tuolumne River
2-23	Section 2.4.4; Table 2-14	Recommend updating this figure to show data through water year 2015 or 2016
2-23	Section 2.4.4; Table 2-14	Recommend updating table to show data through water year 2015 or 2016
2-24	Section 2.4.4; last paragraph; last sentence	Precipitation forecasting technology has vastly improved in the past 10-15 years. See USACE's "Joint Federal Project" (JFP) on the Lower American River. Ongoing construction of the new spillway system for flood control purposes was in part, justified based on forecasting ability. Operation of the spillway system, when complete, is also dependent on accurate long-term precipitation forecasting.
2-25		Ripon is ~14 river miles upstream of the Stanislaus confluence with the San Joaquin.
2-31		It appears that AFRP (the CVPIA (b)(1) provision) has been confused with CVPIA (b)(2) in this section.

Chapter 3		
3-4	3.3.1	Goal #1 under the Geography subsection states "Maintain inflow conditions from the SJR Watershed sufficient to support and maintain the natural production of viable native fish populations migrating through the Delta." What is the purpose of specifying "viable" native fish populations? The term viable can be defined several ways. We recommend clarifying what the term viable represents and how it influences the attainment of the goal. In addition, it is important to consider the benefit or impact to native resident fishes with the geographic area of interest.
3-5	3.3.1	The approach using the proportion of mean 7-day unimpaired flows is the most appropriate method to achieve biological objectives presented in the SED.
3-7	2nd paragraph (under Goal #3)	"Increased floodplain habitat" without any flow manipulation (increases) would be a difficult endeavor for the LSJR Eastside tribs. Given the current, degraded state of the 3 Eastside tributaries of the LSJR, a combination of both physical manipulation of the river corridor (e.g. floodplain re-contour, levee set-back, etc.) with that of flow increases, would be a more realistic approach to achieve this goal.
3-10	3.3.3	The adaptive management approach should implement the preferred alternative while considering native fish populations that do not migrate through the Delta.
3-15		Averaging across a 7 day minimum greatly reduces the variability in the hydrograph, may minimize the beneficial effects. A 1-3-day running average (or as close to that as possible, given constraints) with a reasonable lag time would be preferable. Utilizing the minimum lag possible would maximize the overlap between flows and other environmental parameters such as air temperature, barometric pressure, and cloud cover.
3-15		800-1000cfs minimum Vernalis requirement. Who adjusts this and how?
3-16	3.3.8	What entity will provide the resources needed to (1) ensure appropriate staff support among the state and federal agencies involved in the STM Working Group, and (2) support/implement the monitoring and research needed to inform the adaptive decisions made by the STM Working Group?
3-16	3.3.8	Will biological goals be developed for all life stages and other native fishes (beyond salmonids)? For example, Goal #3 states "Provide flows in a quantity necessary to achieve functions essential to native fishes such as increased floodplain inundation, improved temperature conditions, improved migratory conditions, and promote other conditions that favor native fishes over nonnative fishes." As a result, the native fish assemblage will need to be monitored and thus an achievable target needed to be developed. If only salmonids are monitored and it is hypothesized that their status correlates with the other fishery objectives, than this hypothesis should be tested or further justified using existing literature.
3-16 and 3-17	3.3.8	We recommend that the STM Working Group and the State Water Board be technically and scientifically evaluated at a regular interval of time (e.g., 5 years) to ensure it is functioning as prescribed and implementing adaptive management appropriately given the objective adopted at its inception. Currently, the SED only prescribes that a comprehensive report be evaluated.
3-17	3.3.8	What agency will be responsible for developing the STM Working Group's comprehensive report? We presume the State Water Board, but the report is to be given to the State Water Board. Additional clarification is needed.
3-19	3.3.9	Should sub-section 3.3.10 be a subsection of 3.3.9?
3-36	3.4.1	There should be biological goals paired with the SDWQ alternatives similar to those paired with the LSJR alternatives. The salinity concentration in the Delta can have profound impacts on the aquatic ecosystem. Some research suggests that higher salt concentrations and variability (regional and seasonal) in salt concentrations within the Delta can benefit the native fish assemblage and negatively impact non-native invasive species. Alternatively, maintaining the Delta as a freshwater canal system may exacerbate the impact of non-native fish species and plants on native fish of management concern.

Chapter 4		
4-2	First hollow bullet	Is the omission of Tuolumne River intentional? Also, would the last line more accurately read "pulse flow portions of April and May" rather than "in April and May" or were the baseline requirements in the non-pulse portions of April and May modified in some way due to VAMP inclusion?
4-2	Second hollow bullet	The 2009 BiOp had different year type thresholds/delineations than USBR's subsequent implementation used. USBR adopted the year type thresholds/delineations that were in their 1997 IPO. (See NOAA's January 21, 2010 clarification to SOG). The 2009 BiOp also envisioned the driest years using a flow regime amounting to 98 TAF for less rather than 185 TAF. What does the SED modeling use?
4-2	Third hollow bullet	These are contract amounts. The modeling used demands that were below full contract amounts. As such, this bullet is misleading and should be clarified.
4-2	Fourth hollow bullet	This is a great place to clarify where (what extent of each basin) is assumed to contribute to the unimpaired flow, i.e., where is the UF calculated? Is the Stan's UF based on estimates for the location of Goodwin Dam or estimates of inflow into New Melones?
4-3	First bullet	Please clarify that the modeling uses perfect foresight of inflows or that it is using some estimated historical forecasts. If the latter, then please indicate what exceedance level hydrology those estimates align with, e.g., 90% exceedance.
4-3	Second bullet	This sounds like the modeling fixes the allocation to contractors sometime in the spring and doesn't change it until sometime in the following winter or spring. Please explicitly state what the model assumes regarding revising allocations as the year unfolds.
4-3	Last bullet	Does this include flood control capacities, e.g., 8000 cfs on the Stanislaus?
Chapter 5		
5-23 to 5-25	5.2.4	General Comment for Section: Would be appropriate to illustrate all data tables and figures through the most current water year on record. Would be nice to see the difference in such data between dry years and normal-to-wet years.
5-65		How minimum reservoir storage targets will be met while still implementing a %UF schedule is unclear.
5-67	Figure 5-7	It is unclear how reservoir storage will be higher under the 60% unimpaired storage than under baseline conditions during drought periods. Would the extra storage come from conditioning water rights?
Chapter 6		
6-6+	Figure 6.1	Appears to show the confluence of the Sac and SJ rivers at ~55 ft. elevation. Google earth has the elevation at the Stanislaus confluence ~25 feet. This graph also conflicts with Figure 6.4 which appears to have more accurate elevations at the confluences of STM with SJR.
6-14	Tuolumne Sub-Section	General Comment for the Tuolumne Sub-Section: A key feature on the Lower Tuolumne River is the vast remnant mining pits which severely fragment the longitudinal geomorphic processes of the river system. These are also known as the "Special Run Pools." At lower flows, these features essentially act as intermittent lakes residing between flowing pool-riffle reaches that appear more like a river should appear. They are extremely disruptive to natural physicochemical and ecological processes that should be occurring in the lower river. Suggest including discussion of these Special Run Pool features as part of the Environmental Setting.
6-14	last paragraph	Point bars are not "over-bank" features, they are in-channel features that sit below the banks. Consider revision.

more than one page throughout Section 6.4	6.4.2	General comment for Section 6.4.2: Gravel transport is a natural phenomenon. The language used in this section (and document overall) seems to imply that any level of gravel transport is a negative effect/impact. On the contrary, it is widely accepted that the aquatic life residing in rivers have adapted to not only the flow regime, but also the gravel transport regimes of rivers. Specifically, from the field of disturbance ecology, it is thought that there is usually an intermediate level of gravel transport that indeed enhances the overall ecology of the river (a bottom-up effect) (CITE). Perhaps a discussion of the importance of maintaining a healthy, intermediate level of gravel transport (which is a combination of erosion and sedimentation processes) would help to generate a more holistic/realistic view of the system dynamics and relevance to beneficial uses in this analysis? See the "Intermediate Disturbance Hypothesis" (IDH) by Townsend & Scarsbrook (1997). *Note sentence on page 6-35 (3d paragraph) eluding to the above: "Furthermore, any gravel movement that would occur is known to be beneficial for aquatic habitat enhancement (Chapter 7, Aquatic Biological Resources; McBain and Trush 2000; Kondolf et al. 2001; Stillwater Sciences 2001, 2004)." This is helpful but this commonly held belief should be called out up front for the reader's comprehension of what gravel transport, erosion, and sedimentation really entail in terms of analysis.
Chapter 7		
7-3	7.1	Justification of the indicator species for anadromous fish (steelhead and fall-run Chinook salmon), coldwater reservoir fish (rainbow trout), and warmwater reservoir fish (largemouth bass) is needed. The use of indicator species should be expressed as a series of hypotheses where the status of one taxa over time represents the status of other taxa based on the actions associated with each of the alternatives being evaluated. Although fall-run Chinook have been well studied, there is considerable uncertainty regarding how each of the alternatives would impact their viability over time. Further, it is not clear how the viability of Chinook salmon or steelhead correlates with the status of other native fish of management concern including lamprey, delta or longfin smelt, and Sacramento splittail and other cyprinids. We presume that the variability of flow during the spring could benefit these other native fish, but it should be explicitly evaluated and explained in section 7.1 or 7.4.
7-3	7.1	There is a possibility that Central Valley spring-run Chinook salmon could become reestablished in the San Joaquin River basin given the implementation of the San Joaquin River Restoration Program. The reestablishment of spring-run Chinook salmon in the San Joaquin River basin is prescribed in the spring-run Chinook salmon recovery plan. Therefore, the State Water Board should consider including spring-run Chinook salmon as another indicator species for anadromous fish.
7-3	Table 7-1	"Other native fish" are noted in Table 7-1. What other native fish were evaluated?
7-4	Table 7-2	The location and habitat information presented in Table 7-2 needs to be updated. Central Valley spring-run Chinook salmon will likely occur in the LSJR geographic area prior to 2022 given the implementation of the San Joaquin River Restoration Program. In addition, Central Valley steelhead will also likely occur upstream of the confluence of the Merced River prior to 2022. Lastly, Sacramento splittail occur in the LSJR geographic area and upstream of the Merced River confluence.
7-4	Table 7-2	The Sacramento hitch should be included in Table 7-2 and in the species description section (7.2.1?) based on being a California species of special concern.
7-4	Alt 2	"In the Tuolumne and Merced Rivers, weighted usable area (WUA) for Chinook salmon fry and juvenile rearing would decrease, but floodplain habitat would increase in response to higher spring flows." How can rearing habitat decrease when floodplain habitat is increasing?
7-5	Alt 3	It seems unlikely that conditions for rearing would be "substantially improve(d)" on the Stanislaus under this Alternative, as the current OCAP operations provide nearly the same flow conditions.

7-10	Table 7.2	Location of Delta Smelt should include the lower Napa River, inclusion of this location may be complicated in location description given the "upstream/downstream" terminology
7-13	Table 7-3	Recommend that largemouth bass be broadened to black bass (Micropterus sp). Misidentification is fairly common and other species occur as part of the recreational fishery in the San Joaquin River.
7-14	White Sturgeon	Location should include Sacramento and SJ rivers and their tribs
7-14	Table 7-3	White Sturgeon have been recently documented to occur and spawn in the LSJR geographic area.
7-15	7.2	Format/units should be standardized among all species descriptions. For example, some temperatures are reported as F whereas others as C (and F).
7-16	Spring-run Chinook	It has not technically been proven that Spring-run Chinook Salmon are not present in the SJR basin eastside tributaries. As such, and due to the fact that salmon exhibit a high level of straying behavior, consider revising such language to reflect that there is still a *potential* for Spring-run Chinook salmon to occur in the SJR basin eastside tributaries. Bottom line is there is no way to disprove this so long as they occur in the California Central Valley.
7-19	Green Sturgeon	The Sturgeon Fishing Report Card data reports are cited, yet the San Joaquin River was left off: there are several years when Green Sturgeon have been reported in all three SJR reaches defined on the report cards. Spawning has also been documented on the Feather River (Seesholtz 2014) and likely spawning behavior observed on the Yuba (Bergman?). Moyle suggested spawning because Radtke reported catching JUVENILE Green Sturgeon at Santa Clara Shoal which is a site adjacent to Brannan Island, not a second location.
7-20	Green Sturgeon	Kohlhorst 1976 presumed that the fish they were catching were White Sturgeon, so referencing that for temps is dubious. See Poytress et al. 2015 for better info for sentences regarding the timing and conditions associated with spawning.
7-20	throughout	In this section "Delta Smelt" used in both the plural and singular. AFS convention provides that common names be capitalized, e.g. Delta Smelt.
7-20	DS, 2nd paragraph	Consider revising sentence "Delta Smelt is endemic to only...." The use of "endemic" and "only" creates the impression of redundancy
7-20	DS, 2nd paragraph	Include lower Napa River as part of geographic distribution
7-20	DS, 3rd paragraph	First sentence: The term "first flush" was used in the FWS OCAP to describe the first precipitation-driven event, where the system receives an influx of fresh, turbid water. Influxes of fresh, turbid water into the Delta can, indeed, occur multiple times in the winter. Consider revising sentence to state that Delta Smelt respond to precipitation-driven runoff into the system. Having more than one "first flush," as this sentence suggests, isn't intuitive. If the author intends to keep "first flush" in the text, then some description should be added to clarify the term: for example, the USFWS OCAP provides turbidity levels for "first flush." Then the author could maintain the term and make it plural (to describe all precipitation-driven events that meet some particular criteria). Suggest rewording.
7-21	2nd paragraph	Please provide reference to support second sentence
7-21	3rd paragraph	First sentence: strike "seem."
7-21	3rd paragraph	Please provide reference to support the sentence that starts "Few daylight trawls..." Unless the NMFS 2009 reference is meant to support this. If so, consider using a more applicable reference (i.e. not NMFS).
7-22	1st sentence	True. More correctly, this could be written that LFS is a candidate species for listing under ESA (warranted but precluded)
7-22	1st full paragraph	Second to last sentence: the way this is written, the reader comes to understand that "ocean-going" is being given as the direct definition for "pelagic," whereas pelagic defines the individual's location in the water column. Consider revising for clarity.
7-23	7.2	It may be warranted to specify that Sacramento splittail require prolonged floodplain inundation (~30 days in duration) to produce strong year classes, which could be affected by the implementation of LSJR alternatives.

7-27	White Sturgeon	Disagree that White Sturgeon are observed in the SJR only in wet years. Sturgeon fishing reports cards and USFWS studies show presence every year, even the recent string of critical dry years (see Jackson et al. 2016 for information regarding spawning detected in 2011-2012, we have annual reports describing 2011-2016 spawning surveys, 2013-2016 larval migration surveys, and 2012-2016 telemetry). Evidence to date demonstrates that White Sturgeon attempt to spawn in the SJR every year and suggests that they only do when they receive an adequate streamflow cue.
	7.2.1	subsection title is missing
7-29		"State Water Board) will continue to coordinate adaptive implementation and future changes to the 2006 Water Quality Control Plan for the San Francisco Bay/Sacrament–San Joaquin Delta Estuary (2006 Bay-Delta Plan) with the SJRRP" Is this currently happening? IF not, then how can we expect it to "continue?
7-29	7.2.2	The use of steelhead as an indicator species is questionable based on limited data and high uncertainty associated with the data that currently exists within the Merced, Tuolumne, and Stanislaus rivers.
7-31	Table 7-4	January should be considered "primary occurrence" for both incubation and rearing.
7-31	Table 7-4	Data from the Stanislaus Weir show O. mykiss passage from Sept-Mar and also May. The table should reflect this information.
7-32	Figure 7-1	The figure should be updated and provide fall-run escapement data after 2011.
7-33	Flow Regulation	It is incorrect to state that the AFRP believed that the Final Restoration Plan flow schedule would double salmon production. The Working Paper provided flows that were expected to double production (at the time) but the FRP flow schedule was greatly reduced with a filter of "reasonableness".
7-34	7.2.2	"Currently, fall-run Chinook salmon are known to spawn in a 23-mile stretch of the Stanislaus River downstream of Goodwin Dam, but most spawning occurs in the first 10 miles below New Melones Dam (USBR 2011)." This statement is inaccurate.
7-35	Disease	Need a citation for RST disease accounts.
7-37	Habitat Alteration	The most significant habitat alteration by many experts are the "Special Run Pools". These vast, remnant mining pits are essentially intermittent lakes, and are completely disruptive to the natural downstream progression in river character (both physical and ecological). The river continuum concept (Vannote 1980) is totally disrupted multiple times. There is more Special Run Pool Habitat than actual free-flowing pool-riffle morphology in the most significant portion of the lower river - the upper anadromous salmonid spawning reach. Consider the negative impacts these remnant mining pits that occur on the main channel have on physical processes, water quality, and the ecosystem overall.
7-50	7.2.2	The statement "Agricultural diversions have the limited potential to remove spring-run and winter-run Chinook salmon adults, juveniles, or fry, or any life stage of Central Valley steelhead from the Bay-Delta." is not appropriate. In fact, the loss of juvenile fall-run Chinook salmon or steelhead is unknown, but is suspected to occur.
7-51	7.2.2	We recommend that more focus is given in describing the environmental conditions of the LSJR in relation to native fish populations with a focus on the characteristics influenced by the alternatives or that may interact with the effects of the alternatives. It may be helpful to develop or present the conceptual models linking alternatives to environmental characteristics being discussed in this section.
7-52	7.3.1	The San Joaquin River Restoration Settlement Act could/should be identified if the assessment extends upstream of the Merced River confluence.
7-58	7.4.2	It is unclear how the flow and floodplain models were run to provide the cumulative distributions by percentile. Some description of the models may be necessary to evaluate the validity of the results (%change) reported later in this section.
7-62	Table 7-7	In Table 7-7 for Impact AQUA-3, it states that Impact AQUA-3 pertains to quantity and quality of spawning and rearing habitat resulting from changes in flow. However, the data and methods used appear to be focused on quantity and ignore quality of habitat.

7-64	Physical Habitat...	WUA methodology is insufficiently described. WUA values are scaled (area/distance) but it is unclear whether spawning areas were calculated for the spawning reach only, or the whole anadromous reach.
7-74	7.4.3	Suitable spawning habitat should be evaluated based on variables beyond depth and velocity. For example, accounting for suitable temperatures may be valuable to bolster the assessment.
7-75+	Tables 7-11, 7-12, 7-13, 7-14, 7-16	The tables lack units for WUA values (meters squared?). There also appears to be no reference source for this information.
7-80	Juv Rear - Chinook	WUA values appear to be capped at 1500 cfs (Table 7-10). Lack of inclusion of inundated floodplains at higher flows gives a false impression of the actual available habitat as well as the percentage that is available. Expect these numbers probably came from Aceituno 1993 and do not reflect the current in-channel and floodplain models.
7-87+	Table 7-15	The table needs additional information either in the text or caption what is meant by "percentile" on the y-axis.
7-94+	Tables 7-17	Is temperature factored into this WUA calculation, or just depth and velocity? It appears that temps were not included, which basically invalidates any of the oversummering information, and will greatly overstate Tuolumne and Merced O. mykiss summer habitat.
7-115+	Tables 7-22	The analysis for June temperatures appears to be missing
7-136		Impact AQUA-7, the evaluation of redd dewatering was conducted at too coarse of scale to provide meaningful results given the scale at which the alternatives would be implemented on (i.e., running 7-day periods). The additional variability in flows from the alternatives is of concerns regarding Chinook salmon. Dewatering a redd for even a day could negatively influence redd viability and fry production. Additional analyses are needed to address this potential negative impact.
7-139		Impact AQUA-8, the evaluation of peak flows should consider the variability in dissolved oxygen resulting from increased dam releases. There is empirical evidence that dissolved oxygen declines during the spring as a result from increased dam releases.
7-140		Impact AQUA-9, the evaluation of floodplain benefits should account for the duration of inundation for a given spatial area. The benefit from floodplain inundation is related to the duration of inundation relative to increased autochthonous productivity, increased or decreased temperature pending the season, ability of fish to occupy the floodplain for a time that is biologically relevant (i.e., rear or spawn), and ability of non-native piscivorous fish to occur in the habitat and mitigate the benefit to small native fish.
Chapter 16		
16-119	3d paragraph	Post-project monitoring for gravel augmentation efforts is mentioned here. Recommend including the importance of conducting post-project monitoring in relation to *pre-project* conditions (e.g. in a Before-After context). Too often gravel augmentation efforts are evaluated in a post-project context only, which has far less meaning or strength in conclusions regarding project effectiveness.
16-131 to 16-132	(last sentence of 16-131)	Agree with stated typical post-project monitoring activities. However, we feel it is important to stress the importance of comparing such results to *pre-project* conditions. A Before versus after approach is a significantly more powerful monitoring approach. Post-project evaluations only are too often conducted, and this diminishes/constrains our ability to assess effectiveness and draw valid conclusions, and also impacts our ability to enhance designs in the future.
16-204	Invasive Aq Veg	The section fails to take into consideration the potentially beneficial effects of managing the system to allow periodic influx of saline water to reduce populations of undesirable non-native freshwater species such as Egeria and Asian clams.
Chapter 19		
19-2	Second sentence	It should be clarified that flows in summer and fall are increased over unimpaired flows for irrigation purposes and winter flows are actually reduced from UF. As written it is unclear how flows are shifted in fall and winter and summer flows are not mentioned.

19-3	first paragraph; first sentence	Suggest revising to "it is widely thought that the basin now only supports fall-run Chinook salmon populations". *It has not been proven that CV Spring-run Chinook salmon are not present at times in the LSJR basin.
19-3	Figure 19-1	**The Tuolumne River Difference is not accurate (the other watersheds look okay). This figure suggests the Difference for the Tuolumne is around -18,000 fish. The Difference for the Tuolumne is actually around -12,035 fish for the stated time period. - Source: Chinookprod (AFRP).
19-3	Figure 19-1	Chinookprod results utilize a hatchery proportion methodology that over represents the naturally produced fish in most cases. Thus, the situation is actually worse than represented here. [http://escholarship.org/uc/item/7237t9xn Huber and Carlson 2015]
19-4		Suggest that the natural flow regime is also needed between July and January. The unintended consequences of releasing higher flows than UF between July and January, likely creates habitat and increases the abundance of warm-water predators year round that have a negative effect on survival of juvenile salmonids between February and June. A comprehensive – year, round focus on unimpaired flows needs to be incorporated into the State Board's plan. Otherwise the benefits you would get from a higher proportion of unimpaired flows will have less of a benefit than they could otherwise.
19-8		Using temperature between 1970 and 2003 probably does not reflect the increase in water temperatures we are expecting in the future due to climate change.
19-8	2nd paragraph	Petts (2009) supports the concept that flow management should sustain flows that mimic the "yearly.." variability to which aquatic biota have evolved. That would include having lower flows during the summer and fall irrigation season, which is not incorporated into the February- June proposal.
19-9		With climate change, water temperatures are likely to increase over and above those already experienced due to water management at the dams. If you release water from the dams, on an unimpaired schedule year round, the fish may be able to adapt to warming water temperatures due to climate change by growing faster and leaving the tributaries earlier in the season. Otherwise, if you artificially keep the fish in the tributaries longer than they would under unimpaired flows, (higher summer flows than unimpaired) they may run into lethal water temperatures downstream which can't be controlled or reduced by releases from the dams and essentially work as a trap so they perish downstream before getting to the ocean.
19-19		Juvenile rearing life stage extends into April and May in the lower San Joaquin River. It looks right in table 19-1, but the second to last sentence in the previous paragraph (before the table) says the core juvenile rearing life stage was between January and March.
19-20		This section is unclear and contradictory in some cases. It is stated that 30-50% of UF is reasonable protection. However, it is also stated that based on modeling, significant temperature benefits of the smoltification life stage will occur only with 50 to 60% UF on the Stanislaus and Merced Rivers during April and May, and only through March in the Lower San Joaquin River at 60% UF and that other unimpaired flows are not expected to produce significant benefits on optimal salmonid temperature habitat.
19-20		"However, modeling results indicate that significant temperature benefits to the smoltification life stage will occur only with 50% and 60% unimpaired flows on the Stanislaus and Merced Rivers during April and May" Without improvement in smoltification conditions, we can expect little improvement in survival. Why was 50-60% not chosen based on this statement? Please clarify
19-22	Table 19-3	Are adult migration temperatures met through skimming water off the Jan-June period and applying it here, or through cold water pool minimums (or both)? Please clarify
19-22	Table 19-3	The tables shows no significant (10%+) improvement in temperatures for most lifestage categories, except for the 50-60% of unimpaired flow conditions. How will fish populations improve if there is no significant improvement to temperatures?
19-22	Table 19-3	This table shows that 40% UF won't likely improve temperature conditions on the Stan.

19-23	Table 19-4	40% UF only appears to improve conditions for October more than 1 °F. 50-60% UF is necessary to achieve more than 1 °F from March through July, so why is 40% considered protective? Please clarify
19-32	Tables 19-13 to 19-16	These model values should be reported below the confluences. There is no value in reporting the changes above the Merced confluence, as that is outside the affected area as the SED is currently confined in other areas of the document
19-34	Adult Migration Eval	This data may be better analyzed through assessing the average date (and variance) at which temperatures become suitable (and remain suitable) for migration under the various scenarios. Also potential climate change impacts should be considered here. Additionally problematic is lack of a year-round standard, requiring that water be taken from the Jan-Jun period to meet needs outside that window. This point about when conditions become unsuitable applies also to juvenile outmigration (and smolting temps).
19-38		It seems that in March, April and May one would want to meet the core juvenile rearing temperature criteria 100% of the time (which is obtained more frequently with the higher unimpaired flows [40 to 60%]) for as much of the river as possible. It would be interesting to see how 100% unimpaired flows affect water temperatures in the tributaries and in the mainstem San Joaquin River for comparison. Meeting this water temperature criteria, only part of the time, for part of the river, seems less than reasonable protection.
19-40		Under baseline water temperatures, water temperatures in June are approaching acutely lethal temperatures (76 degrees; Brett et al 1982). That may be why we no longer see many fish migrating out of the tributaries in June. We have essentially truncated the population by killing these late migrants. This serves to reduce the resiliency of the Chinook population. The 50-60% unimpaired flows had significant improvements in the amount of time USEPA smoltification criteria was met on the Stanislaus River. For river management for the benefit of fish and wildlife, this criteria should be met 100% of the time.
19-40		That the lower unimpaired flows (20 – 30%) do not result in significant improvements to smoltification temperatures in the lower reaches of the river, which suggest that 20-30% unimpaired flows are too low, since 30-60% unimpaired flows do provide significant improvements to smoltification criteria. Reducing water temperatures in June would serve to extend the period of smolt outmigration and reduce the metabolic needs of predators in the river which may also have longer term benefits if the colder water later in the spring inhibits reproduction of warm-water predators in the river and tributaries.
19-41		Under the 60% unimpaired flow during June, water temperatures are reduced significantly on the Tuolumne River for ¾ of the river. We think this level of reduction in high temperatures is needed to significantly achieve needed benefits for salmon and steelhead during June.
19-41		The baseline flows for the three tributaries is likely highly inadequate to meet the goal of reasonable protection. It is debatable whether 30-50% unimpaired flows will be sufficient or 60% or higher is needed for improvements in all months including June.
19-42		Not meeting summer rearing temperatures will have ramifications for steelhead. Suggest we prioritize meeting the EPA's temperature recommendations downstream of the dam for all months, so that there is at least some temperature refuge for some steelhead through-out the summer period (June- August).
19-43		It is stated that significant temperature benefits occur during March with 60% of unimpaired flow, but 60% unimpaired flows are not recommended. We believe that a higher percentage of unimpaired flows would create more benefits to juvenile salmon survival by reducing water temperatures in the lower San Joaquin River and increase the number of juvenile salmon and steelhead entering the Delta.

19-48		It is commendable that the SWRCB recognizes the importance of water temperature to the variability of San Joaquin basin stocks. Where temperature can be decreased during all periods, benefits will accrue for all life-stages. We recommended the highest levels of unimpaired flows such that water temperatures can be decreased and production improved in the San Joaquin basin as well as contributing to the resiliency of the portfolio of salmon stocks in the Central Valley.
19-50		It appears that Figure 19-7 is average daily water temperatures, but it does not state that explicitly in the legend.
19-52	Figure 19-9	Suggest altering the x-axis to reflect actual dates (e.g. months) instead of day number for the year. Its work for the reader to convert the day numbers into dates, and its more easily interpreted using dates.
19-54		Constructing lower-elevation floodplains may create habitat for warm-water predators, depending on the water temperature on the floodplains and whether it is inundated year round or only during the spring.
19-69	Tuolumne River Floodplain Evaluation Results; 20-60% Unimpaired Flow	February and March are critical rearing time periods for fall-run Chinook salmon on the Tuolumne River. Typically, juveniles begin outmigrating in April/May.
19-69		How are the results of the baseline on floodplain inundation affected by the VAMP flows in April and May, and by the holding back of flows in the reservoirs in the earlier months for later use for irrigation?
19-69		How would climate change in the future affect the predictions of floodplain inundation in the future. Would it cause less inundation or more?
19-69	Whole Page	There doesn't seem to be any discussion of minimum depth of inundation or minimum duration of inundation. Aren't there minimums before inundation can be considered beneficial? There doesn't seem to be any attempt to relate the minimum inundation requirements to monthly data.
19-69		Floodplain inundation is likely to affect fry more than smolts, but under the proposed scenarios, it seems like there is a mismatch between the proposed action and the potential benefits.
19-70		It appears that flows of greater than 4000 cfs are a threshold for floodplain inundation for the mainstem San Joaquin River for reaches 1 and 2. Unfortunately they don't occur very often. Higher flows are needed downstream, with substantial benefits above 7000 cfs, which also don't occur very often.
19-70		Increasing flows to 7000 cfs in April and May of more years, would allow the installation and operation of the head of Old River barrier (can't be operated at flows greater than 7000 cfs), and increase salmon smolt survival from Mossdale to Jersey Point.
19-70		Reach numbers for the San Joaquin River are in conflict with the SJRRP reach numbers and this should be rectified during coordination with SJRRP
19-71 - 19-73	Entire Section	The monthly time step of the hydrologic modeling misrepresents how many acre-days of beneficial floodplain inundation a tributary experiences under a particular scenario alternative. The term acre-month is more accurate, given the monthly WSE. Further, the level of inaccuracy (of using monthly average flows as an indicator of days of inundation) may be significantly different for each alternative which vexes the old modeling qualification that the results are valid for comparative analyses.
19-78		It would be good to predict 2004-2016 data and compare it to model runs.
19-86		It should be clear how flows would be shifted, how monitoring would be conducted and how decisions would be made relative to determining success.
19-86		An important component of restoring native fishes is having high-discharge events (i.e. greater than the 40% UF). Flow variability is an important component of native fish ecology and should be prioritized

Appendix C		
C 2-26	Appendix C	The pattern of reduced spring flows and increased flows during the late summer and fall (generally August to November), has resulted in less variability in flow during the year. Without incorporating flow standards for the whole year, this pattern may not change.
C 2-27	Appendix C	How is the increase in unimpaired flow due to the DMC going to be incorporated?
C 2-31	Table 2-16	This table shows how flows are actually increased over unimpaired in August - October, which will have and has had ecosystem effects downstream by providing habitat to warm water predators in the system. The same effect would occur on the other tributaries as well.
C 2-42	Figure 2.13	This graph illustrates how the spring flow, which salmon have evolved to, has radically been changed and is shown when comparing unimpaired flows to the observed flows in the SJR at Friant.
C 2 -51	Table 2.32	How do you obtain a negative unimpaired flow? Please clarify
C 2-52	2.5.1	The spring HOR barrier is also installed in some years - 2012, 2014, 2015 and 2016. as well as previous years 1992, 1994, 1996, 1997, 2000-2004, 2007
C 2-56	2.6	The greatest reduction in unimpaired flows at Vernalis has occurred during peak spring snowmelt months of April, May and June, with a median of 25%, 17% and 18% of unimpaired flow respectively. While increasing this proportion to 30-50% will have some potential incremental benefits, we should strive to meet the total needs of the species (~60% based on staff report), to get benefits to meet the doubling and recovery goals for salmonids in the San Joaquin basin. Similar reductions have occurred in each tributary during these months, and have negatively affected the production of salmonids for decades.
C 3-2	3.1.2	Salmonids need a more natural flow regime during the whole year, not just February - June period, because what happens the rest of the year, will impact salmonids between the February - June period. Perhaps a maximum of unimpaired flows for other times of year might be warranted to maintain the pattern of flows through-out the year that the fish have evolved to.
C 3-3	2nd paragraph, 2nd line	This statement is not accurate. §3406(a)(2) states that "fish and wildlife mitigation, protection and restoration" shall have the same priority as "domestic use" and that "fish and wildlife enhancement" shall have the same priority as "power".
C 3-4	Table 3.1 footnote **, 2nd sentence	The meaning of this sentence is not clear. The banked water is added to the (b)(2) allocation in the subsequent year.
C 3-5	Paragraphs 3&4	These should be written in the past tense like the preceding paragraph.
C 3-8	last paragraph	The Interim Plan of Operations that contained the ensuing two tables was signed in May 1997 to govern allocations in WY 97 and WY98. This paragraph makes it sound like the 1987 Agreement and the 1997 IPO are one in the same.
C 3-9	last paragraph	Since the ensuing chart was mistakenly included in the RPA and does not reflect the minimum flow of 800 cfs in AN years required by the RPA in its Appendix 2E, it should be revised or deleted.
C 3-23	Figure 3-6	This figure is misleading as it defines natural as fish left to spawn in the river (regardless of origin) and hatchery as those fish taken in to the hatchery to be spawned (again, regardless of natal origin). This results in a mischaracterization of hatchery effects from a genetic standpoint as readers incorrectly assume that natural fish originated from a natural spawning event in the river.
C- 3-23		I believe there is an error in the statement that 100% of the Merced River Hatchery fish were marked through the VAMP study. VAMP didn't use all of the production at Merced, and the proportion tagged has varied over time.
C 3-24	Monitoring Programs	The list is missing the weir counts, otolith study, survival study, snorkel surveys, redd surveys, habitat studies from various entities, especially the irrigation districts, and fails to note that much of this data is not made readily available from the data collection organization.

C-3-29	3.5	The Mossdale trawl between April and June is conducted by DFW, previously DFG, not the USFWS. USFWS conducts it between July and March. The document also has the wrong Figure reference (it should be Figure 3.3 not 3.2)
C 3-39		Total Delta survival in 2009 could not be measured given that receivers were not deployed at Jersey Point and Chipps Island. The Old River route and SJ route measured in 2009 did not go completely to Chipps Island and is not comparable to other years.
C 3-48		Returning the temperature regime back to that which would occur without the dam in the spring seems to be imperative for meeting salmonid production targets, in addition to the flow objectives.
C- 3-48		Water temperatures of over 20 degrees C would be too high for optimal survival and would be considered stressful (USFWS Exhibit 31 1987).
C 3-54	3.8.2	These tables appear to come from the AFRP/CVPIA working paper (need to verify), but the exact reference isn't provided. If so, they are state of the art from over 20 years ago, and perhaps have less relevance than more recent analyses with better data sets.
C 3-59		"However, the draft program of implementation states that the State Water Board will reevaluate the implementation of the October pulse flow and flows during other times of the year after monitoring and special studies during the water rights and FERC processes have been conducted to determine what, if any, changes should be made to these flow requirements and their implementation to achieve the narrative San Joaquin River flow objective." Addressing this issue should not be put off until later as decisions made within the proposed spring timeframe will ultimately impact year-round conditions and management options.
Appendix D		
D-6	Third line from bottom of page	SJRA 110 TAF cap only applies to the pulse flow (VAMP) period. USBR was the party assigned responsibility for meeting Vernalis flow requirements for the rest of Feb-Jun. I don't believe the Board placed a cap on that non-pulse period responsibility, unless with a TUCP Order.
D-8	Line 8	"(forecasted)" is very ambiguous. It should be made clear what is done in actuality and what is done/assumed in the model, e.g., 90% exceedance forecast vs perfect foresight.
D-8	Footnote 4	Isn't the flow objective tied to where X2 is required to be, not where X2 is? Is the "end-of-month" qualifier new or is it a modeling convenience?
D-9	Third line	Isn't the pulse flow 31 days in duration?
D-9	Table D-2	Which set of values is used when X2 is required to be AT Chipps?
D18-D20	Figures D-2 through D-5	This appendix is supposedly only looking at Baseline vs No-Project. Suggest deleting lines for Alt 2, 3, 4 as these are presumably shown elsewhere. Suggest adding storage at the end of May as an indicator of temperature control.
Appendix D	General	Suggest adding a collection of timeseries plots (10 years each?) showing a comparison of flows at Vernalis with values for pulse and non-pulse flows superimposed on the plots for Aprils and Mays.
Appendix F1_Part 1		
F.1-14	Table F.1.2-4	The table's title ought to be modified to reflect the pairing of the NMFS BO flow regimes with the NMI levels in the table was NOT in the BO, but rather an after-the-fact agreement on implementation with USBR.
Appendix F1_Part 2		
F.1-191	end of first full paragraph	How were the monthly WSE flows disaggregated to daily HEC-5/5Q values for the baseline? How were transitions from one month to the next handled?
F.1-200	First sentence	These monthly average temperatures were ostensibly averages of daily temperature or 6hr temperatures. What daily flows were used in the HEC-5/5Q model to compute the daily/6hr temperatures that? Where is that flow data available?
F.1-203, F.1-210, F.1-217	Figure F.1.6-5A, Figure F.1.6-6a, Figure F.1.6-7a	These figures are great except that it is not clear whether the storage is Carryover (End-of-Sept) Storage or Beginning-of-Month storage or End-of-Month Storage. Please label the X axes more completely to eliminate this uncertainty.

F.1-221		How were the Feb-Jun monthly WSE flows disaggregated to daily HEC-5/5Q values for the LSJR Alternatives? Was a 7-day running average of daily unimpaired flow pattern used? If so, how were transitions from one month to the next handled?
F.1-222	second paragraph	These monthly average temperatures were ostensibly averages of daily temperature or 6hr temperatures. What daily flows were used in the HEC-5/5Q model to compute the daily/6hr temperatures that? Where is that flow data available?
F.1-226	Table F.1.6-2a	Are the exceedance data based on daily data, e.g., 34 yrs. * 31 days = 1054 values for Oct, or are the exceedance data based on monthly average data, e.g., 34 values for Oct (and other months)? Please clarify this for this table and all similar tables
F.1-228		The top two charts say "Daily" but there does not appear to be ~30 points plotted for each month. Please explain why for these charts and all similar charts.
F.1-233-F.1-244		These are very interesting results. Great job! They would be even greater if the discharge(s) for each of the scenarios were displayed.
Appendix K		
K - 13		It seems odd that water quality objectives would include protection of downstream agricultural operations form upstream agricultural drainage in the Delta.
K-13		Why doesn't the beneficial use include water temperature standards? There is ample evidence to support flow thresholds at Vernalis based on the information in Appendix C.
K-13		More explanation on how the subjective determination of the reasonable needs of all the consumptive and nonconsumptive demands was determined.
K-13		Based on analyses in Appendix C, SJR basin fall run salmon has a high risk of extinction (a 20% chance of going extinct in 200 years under present conditions). That would suggest much more improvement is needed and what has been in the past is not reasonable.
K-13		Perhaps the reference to the POD studies needs to be updated since it is crossed it out in earlier sections.
K-17		Perhaps a DO requirement of no less than 6.0 be required through-out the year, and not just between Sept-Nov
K-17	Table 3	Salmonids can be found in the Lower San Joaquin River during both the upmigration (adult) period and outmigration (juvenile) period, but the standard for Dissolved Oxygen is only applicable during a subset of the adult migration window. Also, there is evidence that 6pm DO is not sufficient (see Stanislaus SEP references).
K-18	Table 3	The October flow target (1000 cfs) seems overly complicated, and may still be insufficient to meet the fall attraction needs.
K-18	Table 3	800-1200 cfs minimum at Vernalis seems insufficient to meet fish needs.
K-18		Minimum flows of 800 to 1200 at Vernalis are not adequate to meet the narrative goal
K-18		It is critical to identify what level of protection is hoped to be achieved with this percent of unimpaired flows. Otherwise, we will not know what to measure and if efforts have been successful or not.
K-19	Table 3	Taking 65% of delta inflow at the pumps during the adult migration period can drastically increase straying, as fully 100% of the SJ Basin flows could wind up being pumped, leaving little to no chemical signal for SJ Basin origin fish to use to cue migration.
K-20	footnote 16	Consultation with CALFED was struck from previous footnotes. It should also be removed in footnotes 16, 20, 21, & 22.
K-20	footnote 17	The process by which %outflow standards are moved up or down needs to be better clarified.
K-20	footnote 20	Increasing Feb export percent under drier conditions seems counterproductive to juvenile salmon survival.

K-30		"Adaptive adjustments to the flow ... (1) it will be sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta; and (2) it will meet any existing biological goals approved by the State Water Board." Number 1 seems to speak to viability or lack of extirpation, while number 2 could be interpreted to the doubling goal in Table 3 (Appendix K). This should be clarified in the executive summary document and more explicitly stated elsewhere in the document.
K-30	a)	changes to % require unanimous STM consent. This makes it unlikely that we will ever deviate from 40% if water users and agencies are on the STM, unless outside factors influence the process.
K-30	b)	One STM member can convince the executive director to change the flow schedule. This is not Adaptive Management, it is lobbying. Also, how can you project future inflow to make the best decisions?
K-30	c)	Holding flow for outside the Feb-Jun period will likely result in efforts to game the system, as well as robbing from the juveniles to support the adults or oversummering steelhead. A year round standard is necessary.
K-30	d)	800-1200 cfs base flows @ Vernalis seem insufficient, though adjustment requires unanimous consent of the STM. The either 1 member or all members criteria seem both too flexible and too stringent for the a)-d) criteria.
K-32		STM membership is not adequately defined.
K-32		Will the STM consider resulting conditions in the Delta for fish and wildlife benefits in their deliberations of adaptive management operations.
K-32		Biological goals should be developed before the percent of unimpaired flow is determined to determine how much flow is needed to achieve specific goals.
K-33		It's not likely that 30-50% of the unimpaired flow between February and June will result in meeting the salmon doubling objective, given average conditions in other parts of the life-cycle.
K-33	Biological Goals	It seems unlikely in the face of the current state of conflicting science over water/fish, that a group comprised of agencies and water users will come to agreement on a set of biological goals. How does the Board plan to facilitate the process?
K-33	Compliance	The Board should develop a plan for compliance. Leaving this element in the hands of affected parties increases the chance to game the system.
K-34	Implementation	The Adaptive Management plan should not be put off into the future. More concrete procedures should be outlined by the Board as part of this revision and not left to the STM to define. It is very difficult to get a group of opposed stakeholders to function if there is no rule set in place ahead of time.
K-34	Operations Plan	It appears to state the methods for calculating unimpaired flow can be updated annually. This seems unnecessary, and an opportunity for opposed parties to fight rather than plan.
K-34	October Pulse	Why is this being deferred until later? When is later? It does not seem logical to have to reopen water rights in the future after opening them for the Jan-Jun period.
K-34		Without more specificity on how the adaptive adjustments are to be made and what criteria will be used to determine if they are beneficial, assessment of their value is unclear.
K-34		It the SWRCB does not require monitoring, how will the success of any one component of the Bay- Delta plan be assessed?
K-35		Survival should be added to what will be monitored. And Delta monitoring for fish from the San Joaquin tributaries should be added.
K-35	Emergency	We often have "emergencies" with water in California, and nearly always, the instream flow needs of the environment are the ones that take the hit. Will emergencies affect the minimum pool guidance for the reservoirs, the instream flow, or both?
K-35	SJRMEP	It is unclear who will be conducting these studies and who will be paying for them. Who is in charge of determining what monitoring is necessary?

K-36	Annual Report	Who will develop this report?
K-36	Comprehensive report	Who will develop this report?
K-42	SJ Salinity	Appears to imply that USBR is still on the responsible for salinity, though other parts of the document seem to depict a different standard.
K-48		Recirculation poses numerous issues for fish migration and homing.
K-48		Recent work by Rachel Johnson suggests that selenium discharge from the Grasslands was potentially responsible for deformed splittail that were found at the Tracy Fish Facility in 2011. This seems like a water quality concern that needs to be addressed.
K-50		It seems like the CVPIA Land Retirement Program that USBR and Westlands are implementing should be incorporated into a staged approach for reduced demand of water as well as reducing drainage return. As land is retired water should be allocated to higher protection of fish and wildlife beneficial uses.
K-50		Releasing wetland and ag drainage during high flows for dilution, is counter to reducing the amount of ag return flows to the river, regardless if salinity objectives at Vernalis are met, as there are other water quality constituents that are harmful in ag return water that you don't want returned to the river regardless of what the flow in the river is.
K-50		There is adequate information now that would demonstrate a higher level of unimpaired flows is needed to reasonably protect salmonids and contribute to the doubling goal.
K-53	AFRP/CVPIA	this section discusses the narrative objective and the possibility of adding/replacing with a numeric objective. We recommend incorporating the numeric objective now
K-56		Impacts of aquatic nuisance species are exacerbated by low flows. If the SWRCB was to require higher unimpaired flows during the spring and restored the pattern of unimpaired flows through-out the year, we could reduce the spread and proliferation of aquatic nuisance species.
K-57		In Appendix C, Mesick is cited as identifying flows as the limiting factor for salmon production in the San Joaquin basin, not gravel. Without addressing the limiting factor of the population, you may not get any benefit from the gravel replacement.
K-57	5	Probably should be CVPIA instead of AFRP or include other provisions of CVPIA (e.g. (b)(13), Clear Creek)
K-60	i.e.)	We are not aware of any studies suggesting a need to import silt onto floodplains. This happens naturally when floodplains are inundated.
K-60	ii	This section should note an expectation to reducing vegetation disturbance for non-native invasive species in these habitats.
K-61	v	Clarify if these are real requirements or just model assumptions. It looks like it may just be model assumptions (Appendix F.1, F.1-30 through 33.). If so, this is a huge issue, as none of the modeling conducted is valid without adding this as a constraint.
K-62		The newest data on the HORB suggests, we are not getting much benefit from it at flows less than 2500 cfs at Vernalis (Buchanan et al 2015). Found at https://www.fws.gov/lodi/salmonid_survival_studies/juvenile_salmonid_survival_reports.htm. The use of the HORB needs to be coupled with higher flows to be more effective. Flows of between 6000 and 7000 cfs resulted in survival of between 0.30 and 0.45 from Mossdale to Jersey Point. Survival of these levels is necessary to meet the narrative salmon protection and doubling goals. There should be a provision to at least test these type of conditions to see if we do get those levels of survival with that flow and with the HORB now.
K-64	11	Shouldn't it be the SWRCB's responsibility to evaluate SRRRP flows into the LSJR as part of these efforts?
K-65		Please add USFWS as a part of IEP.