United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay-Delta Fish and Wildlife Office
650 Capitol Mall, Suite 8-300
Sacramento, California 95814

Public Comment
Bay-Delta Phase II Working Draft Report
Deadline: 12/16/16 12:00 noon

December 16, 2016

Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95812

Subject: Bay-Delta Plan Update Phase 2: Comments on Draft Scientific Basis Report

Dear Ms. Townsend:

Attached please find the U.S. Fish and Wildlife Service's comments on the Draft Scientific Basis Report for Phase 2 of the Bay-Delta Plan Update. We commend the Board on having reached this milestone in the Phase 2 planning process. As we stated in the workshop on December 7, 2016, we are very supportive of the Board's ongoing update of the 2006 Bay Delta Water Quality Control Plan (WQCP). This update is an important effort to consider updating objectives for beneficial uses in the estuary and broader watershed. The WCQP provides critical protection for the Bay-Delta and for species dependent on this habitat and we believe that the timing is right for it to be revisited to consider the changes that have occurred in the ecosystem since the last update.

The Draft Scientific Basis Report sets the starting point for identifying relevant science for considering water quality objectives. We are providing the attached written comments to help the Board ensure that the update to the 2006 WQCP is based on the best scientific information. We hope that the Board finds our written comments helpful.

Again, we thank the Board for undertaking this critical effort to update Water Quality Control plan and express our commitment to providing whatever assistance we can to make the process successful.

Sincerely,

Kaylee Allen
Field Supervisor

SWRCB Amendment to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Comment Form

Document: ***Working draft scientific basis report of new and revised flow requirements on the Sacramento River and tributaries...***

Comment Source: Red Bluff FWO

	Page	Line #	Comment	Response
1.	2-11		The Sacramento River watershed also receives water from the Trinity River watershed through an interbasin exchange. Water from Trinity Lake/Clair Engle Reservoir is transfered out via tunnels and penstocks to Whiskeytown Lake thence to Clear Creek. These flows do not seem to be accounted for in Figure 2.2-1 nor in the description of Clear Creek in Section 2.2. The subheadings of sub-watershed regions (e.g. Tributaries of Mount Lassen and Volcanic Buttes Region, Tributaries of the Chico Monocline) aren't described in a Figure so it is unclear why subheading 2.2.4 for Clear Creek is under Tributaries of the Klamath Mountains. There is a Clear Creek that is tributary to the Klamath River downstream of Happy Camp that is not the same as this Clear Creek that enters the Sacramento River near Redding CA.	
2.	2-17		In this section, the reference to the Battle Creek restoration project as "nearing completion" is far from accurate. The current status of that project is that much progress has occurred in terms of increasing flows and building infrastructure, but the ultimate goal of achieving upstream and downstream fish passage to 48 miles of habitat blocked by hydropower projects is far from being achieved. The most recent updates from USBR can be accessed at www.mp.usbr.gov/battle creek or in the pdf file from Mary Marshall, USBR (saved in the s drive folder at RBFWO).	
3.	3-14		Table 3.4-1 Consider adding the month of October-(e.g., October-November) as peak times of adult migration and spawning	
4.	3-14		Table 3.4-1 Adult spawning period of winter Chinook extends to	

			mid August, which is consistent with text on page 3-18	
5.	3-18		The full caption for Figure is shown here, but is truncated in the Table of Contents. The last few words " Abundance of All Races Has Declined between the Two Time Periods" needs to be added to the Table of Contents.	
6.	3-29		The list of steelhead hatcheries in the Central Valley includes "Battle" and "American". The actual names of the hatcheries are the Coleman National Fish Hatchery and Nimbus Fish Hatchery, respectively. Please correct the names of these facilities or correct the statement to indicate the streams where steelhead hatcheries are located.	
7.	3-54		Poytress et al. 2015 documented spawning habitat over 58 river miles. The area was found to extend 22 miles upstream of RBDD and 36 miles below RBDD to GCID. Spawning habitat likely exists as far upstream of RBDD 37 river miles to below the mouth of Cow Creek.	
8.	3-54		Consider adding in data from Poytress et al. 2014 (Compendium report) which indicates green sturgeon emergence in May through July over 13 years of data (2002-2012). Additionally, this report indicates a high degree of variability in larval production with a CV of 236%	
9.	3-55		More recent data available on adult population trends as noted in NMFS 2015 (5 yr status review) : Preliminary results from 2010-14 surveys indicated the presence of the following number of adult Southern DPS green sturgeon in the Sacramento River (with 95% confidence interval): 2010: 164 ± 47; 2011: 220 ± 42; 2012: 329 ± 57; 2013: 338 ± 61; 2014: 526 ± 64; pers. comm. with Ethan Mora, UC Davis, May 6, 2015).	
10.	4-16		In the second sentence of this paragraph, which states "Hatchery management has been identified...", replace the word "salmonid" with "salmon".	
11.	4-16		The paragraph on hatcheries could use some attention. Much of the paragraph focuses on risks that hatcheries pose to the spreading and amplification of fish diseases; however, the information presented fails to mention some of the most common diseases affecting hatchery salmon in the Central Valley and whereas other less troublesome diseases are mentioned. The fifth	

			sentence of the paragraph states that Ceratomyxa shasta is the myxosporan parasite that causes bacterial kidney disease (BKD); this is not correct. BKD is caused by the bacteria Renibacterium salmoninarum, which is different than the parasite C. shasta. Additionally, the paragraph either does not mention or fails to bring adequate attention to other risks associated with hatcheries; such as high rates of straying of hatchery fishes, which is amplified through the strategy of releasing large numbers of hatchery origin salmon into the Bay-Delta. Overall, this section on hatcheries misses the mark and should be reworked.	

Comment Source: Lodi FWO

	Page	Line #	Comment	Response
12.			Table 3.4-3: Should be the CVPIA Baseline period (AFRP is only one provision of CVPIA). This issue occurs in multiple places throughout the document.	
13.	3-21		last paragraph - there appears to be an erroneous reference to the Calaveras River as a tributary with spring-run Chinook spawning habitat. The Calaveras is not considered to be historic or desirable potential future habitat for spring-run.	
14.	3-53 and 3-54		Green Sturgeon - Spawning has been documented in the Feather River (Seesholtz 2014) and possibly Yuba River (Cramer Fish Sciences) recently. Although the information is angler-reported, Green Sturgeon catches have commonly been reported throughout the San Joaquin River and assuming they are not present/spawning is possibly as much an artifact of no concerted sampling as it is any actual information that this species does not utilize CV habitats outside of the Sacramento Basin.	

Comment Source: BDFWO-1

	Page	Line #	Comment	Response
15.	2-55		The DCC could be considered part of the CVP's "delta facilities"	
16.	2-55		The Barker Slough Pumping Plant should be added to the list of the SWP's "delta facilities". If "delta facilities" is intended to extend beyond the legal boundary of the Delta, then the Suisun Marsh Salinity Control Gates and the distribution systems in the marsh are also SWP "delta facilities".	
17.	2-62		It has been very dry most of the time since 2001 compared to 20th century "norms". For instance, there were only two wet years from 2001-2016 (=1/8) when they have an anticipated 1/3 fraction based on the CALSIM II 82-yr time series. This lengthy 16 year "drought" is worth noting in this document. Same comment for Table 2.6-1; when was the last time we saw such a high frequency of BN through Critical years – maybe the 1920s-1930s? The ecosystem was very different back then.	
18.	3-1		"The dynamic nature of flow interacts with the physical environment to produce aquatic habitats suitable for native fish and wildlife". This statement is equally true for nonnative species, in fact, more true for them in the current Delta ecosystem. See Moyle and Bennett's appendix to the 2008 PPIC report.	
19.	3-1		Similar to previous comment, "other stressors" like contaminants, predators, rip-rapped channels, wetland status affect nonnative species as well as native species. The fundamental reasons nonnative species are so successful in the Delta is that summer *inflows* that correspond with their reproductive timing are steady and high (though *outflows* are low), and temperatures are warm, which provides a competitive advantage to warmwater species. The warmwater natives (Sac perch, thicktail chub, blackfish) were displaced a long time ago. The remaining part of the native fish fauna is comprised mainly of coldwater, winter/spring spawning/migrating species several of which are in substantial decline (Moyle et al. 2011).	
20.	3-3		When native fishes survived lengthy historical (pre-development) droughts, they lived in a very different ecosystem with a lot more options on the landscape than they have now. They also existed in	

			an ecosystem with fewer total species competing for resources. Nearly all native species are in pretty considerable decline in the Central Valley and so there is reasonable certainty that current conditions do not support them. It is difficult to know if "more naturally variable flows" will be an "important management strategy" or not. Nature will guarantee variation; what native fish in the estuary seem to need most is higher outflow during the spring through fall *and* a much shallower estuary with a better connection between land and water so that those flows can do more habitat forming work than they can in deep Delta channels.	
21.	3-4		The discussion of floodplains on pages 3-4 and 3-5 should draw better distinctions between natural floodplains and the flood bypasses that dominate the Bay-Delta's remaining flood basin habitats. In natural floodplains, inundation is a function of river stage (i.e., flow and the natural flow regime). The bypasses have gates, weirs, and other control structures that can be modified to change flood frequencies and durations, but which are usually managed to attenuate floods and then drain the water quickly. That results in very different functionality than what the Sacramento River's historical flood basins did (Whipple et al. 2012).	
22.	3-6		Historically, estuary water was fresh enough to drink all the way down to C&H Sugar at Carquinez Strait, which is considerably downstream of the "confluence of the Sacramento and San Joaquin rivers". This reflects the higher outflows and shallower estuary that existed in the early 20th century and prior to that.	
23.	3-12		The historical genetic and phenotypic diversity of Chinook Salmon runs in the Central Valley definitely reflected "adaptations to both the natural flow regimes and physical attributes of their natal streams". However, the current genetic and phenotypic diversity significantly reflects the availability of modern habitats and hatchery practices (Barnett-Johnson et al. 2007; Carlson and Satterthwaite 2011; Satterthwaite and Carlson 2015).	
24.	3-14		The duration of freshwater residence for spring run Chinook in Table 3.4-1 is not correct (it's too short) and not consistent with the accurate statements about spring-run residence in the text of the report.	
25.	3-14		The statement about winter-run "rearing in the estuary for an	

			indeterminant period (Moyle 2002)" is dated. Please see del Rosario et al. (2013) and Harvey et al. (2014).	
26.	3-15		The different timing of emigration patterns among salmon runs do reflect differences in spawn timing, but within runs, year to year differences reflect flow conditions as well (e.g., Brandes and McLain 2001; del Rosario et al. 2013; Sturrock et al. 2015).	
27.	3-17		The MacFarlane et al. (2002) study should not be considered a generality that applies to all juvenile Chinook using the estuary (Miller et al. 2010). There is quite a lot of published estuary residence time information available both before and after the MacFarlane paper including Figure 17 in Brandes and McLain (2001) showing residence times up to 60 days just in the Delta. Other sources of similar information include Sommer et al. 2005; Williams 2012; and a slug of papers published in *Environmental Biology of Fishes* in 2013 that provide smolt travel times through the estuary and river systems.	
28.	3-18		The timing of Winter run spawning stated in the text does not match what is reported in Table 3.4-3. In addition, all salmon runs "require cold water to protect their developing eggs". This is not unique to Winter run as it is a concern for Fall and Spring run in the Sacramento River and some of its tributaries as well.	
29.	3-27		Figure 3.4-9 indicates that natural production of Fall run had fallen to very low numbers by 2011. That was five years ago and before the recent drought resurged. It would be helpful to update this figure if possible.	
30.	3-35		New information does not support the statement that Winter run are still entering the Delta in April; virtually all of them have already passed Chipps Island by April 1 (del Rosario et al. 2013; Harvey et al. 2014). In addition, because Winter run emigrants mostly use the mainstem of the Sacramento River, reduced pulse flow magnitudes are unlikely to "block" their emigration. Rather, low flows may slow emigration rates or reduce habitat suitability, both of which would in turn increase cumulative predation loss.	
31.	3-36		The Board staff may have missed some key points with their Figure 3.4-12b. (1) At low flows, most 1998-2015 data fall below the Brandes and McLain regression line suggesting a decline in salmon abundance or survival per unit of flow – especially at low flows. This broadly matches the POD but also matches the declining	

			survival trend for San Joaquin River salmon shown by Perry et al. 2016. Zeug and Cavallo (2013) may explain some of this pattern, but based on my professional experience, I suspect that the proliferation of *Egeria densa* has played a role in declining salmon survival in the Delta by increasing the largemouth bass population (Nobriga et al. 2005; Conrad et al. 2016). (2) The large amount of scatter at low flow may reflect differences in the escapement of the spawners that produced the young fish. In other words, egg supply may be more important to juvenile salmon production in low flow years? (3) salmon CPUE seems relatively more predictable whenever average Apr-June Rio Vista flows have exceeded about 15K cfs.	
32.	3-37		Given declining abundance or survival of juvenile salmon, DCC gate operations that are "nearly as effective at reducing entrainment" are less desirable than present operating rules specified by the Board and NMFS.	
33.	3-39		Older research (cited in the report) definitely supported the hypothesis that the HORB increased the survival of San Joaquin salmon. However, survival has been declining since the 1990s (Perry et al. 2016) and given that degrading condition, one recent study found that salmon had higher survival when they took the Old River route. Most of these fish were entrained and salvaged and that process contributed to higher survival than for fish that stayed in the San Joaquin River and 'naturally' migrated through the Delta (Buchanan et al. 2013).	
34.	3-44		Longfin smelt section general comment: The understanding of longfin smelt population dynamics has increased considerably in the 2010s and it affects several assertions made in this draft report. 1. Longfin smelt that spent their early life in the low-salinity zone disproportionately contribute to the fish surviving their first year of life (Hobbs et al. 2010). Therefore, rearing in the low-salinity zone is one of the "X2 mechanisms", but area or volume of the low-salinity zone is not (Kimmerer et al. 2013). 2. There is much better evidence for a step-decline occurring between 1989 and 1991 than there is for one in	

			1987 (Thomson et al. 2010). 3. There was also a second step-decline in longfin abundance in the early 2000s, most likely 2004 (Thomson et al. 2010). 4. Data analyses of the type presented in Figure 3.5-2 are misleading because they ignore spawner effects on the juvenile abundance index (Maunder et al. 2015; Nobriga and Rosenfield 2016). 5. When adult (spawner) abundance is considered, the influence of Delta outflow on longfin smelt production is not log-linear like it appears to be in Figure 3.5-2. Rather, juvenile production responds more strongly to low flows than to higher flows (Nobriga and Rosenfield 2016). 6. Delta outflow and adult abundance affect juvenile longfin smelt production (Nobriga and Rosenfield 2016). There is no evidence that this production mechanism has been affected by food web changes; those appear to occur later in the life cycle. Therefore, a maximally robust version of the analyses shown in Figure 3.5-3 could include all available data back to 1967. 7. The choices of months used in Figure 3.5-3 are arbitrary and could potentially be improved if the State Board used a correlation matrix approach like the one used by Stevens and Miller (1983) to find which multi-month averaging period best predicts generation over generation population increases. In the spirit of full disclosure however, Jon Rosenfield and I tried to publish analyses of this sort and were told by peer reviewers that they were not statistically valid because of the covariation of flow from one month to the next.	
35.	3-46		"The analysis indicates that flows in excess of 100,000 cfs are needed since the Corbula invasion to meet the USFWS recovery goal..." This statement is not mechanistically correct. There is no evidence that food web changes have affected the flow influence on longfin recruitment (Kimmerer 2002; Kimmerer et al. 2009; Nobriga and Rosenfield 2016). In other words, food web mechanisms are separate mechanisms from the one(s) related to Delta outflow variation. That means longfin smelt need the same	

			Delta outflows that they always have. Unfortunately, it probably also means that if production per unit of flow cannot be restored, the population will be extirpated.	
36.	3-49		"...it is difficult to know whether export pumping has a negative population level effect on longfin smelt..." As noted in this report, there is strong scientific evidence that variation in Delta outflow (and its functional equivalents like X2) affects longfin smelt production. Therefore the negative population level effect of exports is *at least* the % difference exports make in Delta outflow during the winter and spring.	
37.	3-52		"In summary, the salvage-export pattern is consistent with what is known about the spawning migration habits of longfin smelt." This statement is incorrect. The vulnerability of larval longfin smelt to entrainment has more to do with flow conditions during the larval period itself than with flows occurring during adult migration. This is not a dramatically different situation than older scientific discussions about the entrainment of striped bass larvae or *Neomysis mercedis*.	
38.	3-58		General comment for Sacramento splittail: There is no reliable population census for splittail. The population includes somewhere between five and nine generations in any given year and so it is more resilient to environmental variation than what is indicated in age-0 abundance indices (e.g., Figure 3.7-1). I think there's a growing concensus that the USFWS beach seine monitoring provides a better indicator of age-0 splittail production than the FMWT index. Note that many of the splittail abundance indices through the years are single digit numbers, which is considered a huge reliability problem for delta smelt now and therefore should be viewed as a long standing reliability problem for splittail. Splittail are fast swimmers and oriented near the shore (Feyrer et al. 2005; 2015) so they have very limited vulnerability to offshore trawls. The splittail population is going to decline during droughts, but it has historically been resilient to them due to the multiple age-classes alive at any given time (Sommer et al. 1997; Moyle et al. 2004; Sommer et al. 2007) and the recognition that there is more	

			recruitment in low flow years than is reflected in the FMWT (Feyrer et al. 2005). Researchers who have sampled the estuary's nearshore habitats using methods like gill nets that can capture fast swimming fishes, have not had trouble capturing splittail (Nobriga et al. 2005; Feyrer et al. 2015). Further, the effective genetic population size of splittail reflects the number of successful spawners in any given year. It was much higher for the Central Valley population in 2011 than it was in 2002-2003 (Mahardja et al. 2015). Thus, although the splittail population has undoubtedly declined during the recent drought, there is no evidence it has suffered a long-term decline in the sense implied in this draft scientific basis report.	
39.	3-58		The Napa and Petaluma rivers are part of the Bay-Delta estuary. In addition, "vegetated channel edges" "perennial marshes" and "floodplain" are not mutually exclusive habitat descriptors so the attempt at a distinction among them on this page is confusing. Similarly on the next page, "30 or more days of floodplain inundation" should be "Yolo Bypass inundation". The result may not be transferable everywere.	
40.	3-62		The delta smelt life cycle is not as cut and dry as the spawn in the Delta-rear in Suisun Bay conceptual model suggested in section 3.8.1. The SKT data indicate that most spawning occurs around the periphery of Grizzly Island, Sherman Island, and in the Cache Slough complex (Murphy and Hamilton 2013; Polanksy et al. in review). Rearing locations depend somewhat on Delta outflow and the higher turbidity of the "North Delta Arc". The delta smelt spawning "migration" should not be characterized as "slow". The word slow was not used by Grimaldo et al. 2009 in their paper and is inconsistent with subsequent evaluations (e.g., Sommer et al. 2011).	
41.	3-63		There is no delta smelt spawning "run" analogous to salmon. Fish disperse in the winter during storms. That dispersal can lead them in any direction. Some individuals do swim up the San Joaquin River during this population dispersal.	
42.	3-67		"Further evaluation of this relationship [referring to Figure 3.8-3] is needed." That may be correct, but the preceding discussion does not indicate why or in what way it needs more evaluation. For	

			instance, further evaluation may explain why the relationship emerged beginning in the early 2000s, but for now, these are empirical relationships built from well known data sets and so they provide strong evidence for a potentially helpful conservation action.	

Comment Source: BDFWO-2

	Page	Line #	Comment	Response
43.	1-9		Difficult to comprehensively assess effects and evaluate methodologies without inclusion of implementation parameters, adaptive management guidelines, and biologic SMART goals.	
44.	1-12		The emphasis should be on "generally". It is likely there will be specific locations with specific time periods that do require lower flows if developed using the same methodologies.	
45.	1-14		Cold water management - historically, narrative requirements have not proven effective at meeting specified targets, and the feasibility of attempting to meet these narratives depends on the specific, unspecified implementation actions.	
46.	2-60		Agreed. NDOI can be an inaccurate measure of Delta outflow, but it can be a useful regulatory measure for a complicated system centered in a strongly tidally influenced Delta. Context and specifc intent important to the "usefulness" of such surrogates.	
47.	2-62		Improved Delta outflow estimates should be a high priority and should consider the actual physical impacts on species during a twice daily, very strong tidal signal when compared to freshwater inflow volumes.	
48.	2-69		Seems the recent/current drought data is significant in the modeling framework because the systems were operated much differently than in other historical droughts. Additionally, actual biological responses and operational constraints and best practices are still fresh outcomes. Why is not at least part of the recent drought included in the modeling?	
49.	3-5		While dams and reservoirs may cause "detriment" to cold water	

			species, in this context, they also may provide "benefits" given the altered system that will not be changing substantially any time in the future. Oversimplification.	
50.	3-12		Oversimplification. Some factors that benefit salmon will benefit steelhead, but omitting steelhead specific evaluation is sticking with the status quo for a species that, in many locations and different times of the year, has vastly different needs than chinook salmon.	
51.	4-16		Is there a Climate Change analysis coming, or just citing recent studies with no plans/proposals to include future potential climate impacts?	
52.	5-2		Important concept differentiation here: natural hydrographs do not necessarily provide the natural water quality conditions (e.g., temperature, DO) desired in an altered system. Important to better stress this difference throughout the document.	
53.	5-4		Provide rationale for selecting 35/75 sideboards for the analysis.	
54.	5-5		As in other sections, the document refers to additional analyses that will be provided at a later date. In this case, the MRDO/unimpaired inflow and outflow analysis provided utilizes SVUFM and CalSim II modeling comparisons, yet the final, yet to be completed analysis will use the SacWAM model.	
55.	5-5		The current unimpaired flows analysis does not consider "other uncontrolled and controlled" flows including storm event runoff, flood control releases, and power generation operations. From Oct-June, these types of other flows have the potential to dominate any hydrograph in the system. It is unclear how the analysis will change with Sac WAM.	
56.	5-7		Waiting for additional analyses	
57.	5-12		Recommending that Rio Vista flow requirements remain unchanged, without substantial analysis, seems counter to the fundamental oversimplification often repeated in the report that more flows are better for fish. Is there a more detailed analysis, or is that forthcoming as well?	
58.	5-12		Use of current month's ERI to determine Delta inflow and outflow a valid concept, but again, the difficulties lie in methodology and implementation, both of which are missing. Difficult to provide meaningful recommendations without the final sacWAM modeling	

			results and assumptions.	
59.	5-14		SacWAM, subsequent analyses, conservative estimates – appreciate the first look at this draft, but we really need to see the full analysis to comprehensively comment given the potentially large differences between SacWAM and models used in this early analysis.	
60.	5-15		Use of SJ River existing conditions in this analysis seems unrealistic given the proposed changes in the Phase I process. A look at the bounds of 35/75 proposal on SJR would help provide range of potential outcomes.	
61.	5-16		Despite the smaller SJR contribution to Delta inflow when compared to the Sac side of the Delta, management of the San Joaquin side of the Delta largely affects system operations as a whole, and more specifically, south Delta hydrodynamics and salinity intrusion.	
62.	5-19		Sturgeon fecundity – specifically here but also throughout the document, statements are made about increased flows not necessarily helping particular life stages of certain species, then going on to give the generic "science indicates, however, that increased flows will help species". These paired statements are contradictory and have the appearance of using "science" only when it goes towards providing more flow when it may or may not be helpful. They may undermine credibility.	
63.	5-26		Statistical uncertainty repeatedly omitted. It is commonplace to provide some error bounds or confidence intervals when the data fits. Are they coming in the "future analyses"?	
64.	5-27		Narrative objectives – see above comment; what adaptive management provisions - See above comment	
65.	5-29		Water accounting procedures – still under development and forthcoming. This/these are extremely important and at the base of tracking progress towards meeting certain goals.	
66.	5-31		Narrative objectives – see above	
67.	5-35		American River Temp objectives – recommend including the Water Forum Agreement in USBR's water rights permits. The Water Forum is in the process of revising and updating the flow requirement portion of the Agreement, and I believe have been working with your staff in that process.	

68.	5-38		Delta E/I – too blocky in its current form, need more variability in pumping patterns to complement increased inflows.	
69.	5-42		Additional SJR flows – not pumpable beyond what threshold?	
70.	5-42		Health and safety exports limits – a long standing point of contention and misinformation. This is an important data point and should be codified in water rights permits to the extent possible.	
71.	A-34		Unimpaired underestimates produced by aggregating sfc runoff for "smaller" streams is problematic since the goal is to develop % UiF requirements for these tributary mouths, which often times can convey substantial flows from Nov-May.	
72.	A-37		If no Delta depletions in SVUFM, where does the consumptive use get drawn from or aggregated?	
73.	App A		In general, this needs to be much more comprehensive in the final report. It is the most important section from a modeling perspective. At this point, there is insufficient information to provide any substantive review of modeling methodologies, assumptions, and outcomes.	

Comment Source: BDFWO-3

	Page	Line #	Comment	Response
1.	115 and 4-12		The document uses both *Potamocorbula* and *Corbula*. We recommend for overbite clam that the authors select just one genus for consistency.	
2.	3-62	3.7.4.2	There have been several more modern, large, splittail entrainment events since 1998. For example: May 2011 6 million June 2006 4.8 million Source: ftp://ftp.dfg.ca.gov/salvage/	

			Though not included in a referred manuscript the entrainment events after 2009 reflect post-Biop CVP/SWP operations.	
3.	3-62	3.8.1	The USFWS decision that Delta Smelt were warranted for uplisting from threatened to endangered is mentioned elsewhere, but is also relevant in the overview to show the reader the regulatory status of the fish.	
4.	3-62	3.8.2	Would delta smelt in Cache/Liberty Island outside of the adult migration and spawning windows also be considered freshwater residents, in addition to the DWSC?	
5.	3-62	3.8.2	Did the author mean to imply that first flush turbidity resulted from both upstream precipitation AND from "snow melt" in January and February? Significant snow melts seems unlikely during these two months.	
6.	3-63	3.8.2	The "food gap" hypothesis needs a citation or should be deleted.	
7.	3-63	3.8.2	Why are Spring Kodiak Trawl data omitted as estimates of Delta Smelt relative abundance here?	
8.	4-3	4.2.2	There is a lack of emphasis on the effects of riparian tree removal, the shade it historically provided, and the effects to water temperature for native fish habitat.	
9.	4-7	4.3.1.3	Here the status of Regional Boards in addressing ammonia seems out of date. There are larger efforts underway by each regional board to address nutrient management. I am unaware of the status of the CV effort, but the SFRWQCB nutrient management strategy development is underway and is worth mentioning here. Recommend updating.	
10.	4-8	4.3.1.5	EPA has proposed site-specific Bay-Delta selenium criteria. Public comment closed in October 2016. As stated, these criteria are intended to protect higher trophic levels (green and white sturgeon, diving ducks) from selenium bioaccumulation by overbite clam. These proposed criteria	

			for water and fish tissue are lower than the current national criteria which are not thought to be adequately protective. Recommend updating this section with a brief mention of the pending site-specific criteria.	
11.	4-10	4.3.4	The SFE is the southern extreme of Osmerid temperature tolerance. In addition to effects on survival, water temperatures affect the timing and duration of spawning season. High temperatures cause metabolic stress and reduce growth rates in rearing juveniles (Rose *et al.* 2013; Sweetnam 1999; Bennett 2005; Brown *et al.* 2013).	