

Message

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Sent: 5/26/2016 11:51:21 AM
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Subject: NMFS comments from informal review

Michelle,

Per our conversation, attached are our complete comments from the informal review of the working draft of the BA. As noted in the document, these comments are intended to reduce the time needed to review a request for formal consultation on CWF and determine whether the request contains sufficient information to initiate formal consultation. They do not represent pre-decisional views on the subsequent jeopardy analysis and conclusions that will be contained in the Biological Opinion (BO).

Please let me know if you have any comments, questions or concerns. We look forward to continuing to work closely and collaboratively to address these comments as quickly and efficiently as possible.

Regards,
Ryan

California WaterFix January working draft of BA - NMFS informal sufficiency review

These comments and clarification requests represent a detailed review of the January 15, 2016 Working Draft of the Biological Assessment (BA) for California WaterFix (CWF). They are intended to reduce the time needed to review a request for formal consultation on CWF and determine whether the request contains sufficient information to initiate formal consultation. They do not represent pre-decisional views on the subsequent jeopardy analysis and conclusions that will be contained in the Biological Opinion (BO).

May 26, 2016

1. *Issues requiring Additional discussions*

Delta Science Program Peer Review. The Independent Panel's peer review report contains a number of recommendations related to the analyses contained in the BA. It also has a number of recommendations related to parts of the BO. NMFS recommends a meeting to discuss how best to address some of these comments and which would need to be included in the final BA.

Confusing, Non-ESA Terminology. Use words or terms consistent with the ESA, the Services' implementing regulations, and the Services' ESA Section 7 Consultation Handbook (Handbook) as applicable (for purposes of these comments, we will refer to this as ESA terminology or terms). Use of non-ESA terminology, such as negligible, very similar, minimal impacts, little difference, very small, minor difference is confusing and may not convey the intent for purposes of ESA section 7 consultation. If the intent is that the effect is considered "insignificant" or "discountable", those terms can be used. The BA should state the effects, and the Services will agree or not. Therefore the BA should have the determination in ESA terminology, such as "low likelihood of adverse effects." Note that "significant" is not an ESA term; the BA should use "insignificant" if the effect is deemed such.

Based on the Handbook:

"Is likely to adversely affect" is the appropriate finding in a biological assessment if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial. "Is not likely to adversely affect" is the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial.

Beneficial effects are contemporaneous positive effects without any adverse effects to the species. *Insignificant effects* relate to the size of the impact and should never reach the scale where take occurs. *Discountable effects* are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

Summation of Effects. In addition to the need to use ESA terminology comment above, NMFS does not agree with a number of the effects determinations. A follow-up discussion will be needed in light of these and other related comments that may require a change to the determinations. The species determinations in Chapter 7 rely too heavily on real-time operations, even after acknowledging that the analyses show a risk of effects. For instance, the determination for winter-run Chinook salmon claims that "the PA will provide suitable flows and water temperatures" but then identifies the changes in these characteristics due to the PA. The potential for negative effect is discounted by reliance on very

uncertain outcomes of predator control, success of real-time operations (which has not been very protective in recent years), AMMs (some of which are not yet developed), and restoration/mitigation (often off-site). The determinations use subjective terminology that is difficult to interpret (e.g., “minor”, “small”), and will present a challenge when conducting a jeopardy analysis that assesses the effects in light of the current condition of the population.

Real-Time Operations and Temperature Management –Per the principals meetings on 3/14 and 4/12, ongoing effort is needed to address revising language in the BA and may result in requests for auxiliary analyses to address real-time operations concerns, or a range of effects based on modeling of another scenario.

Drought language. Current language seems to imply that modifications (TUC, etc) would be made to operations starting after a single dry year in any basin. This language needs to be edited to reflect clearly that the intent is to start preparing for potential droughts earlier in the process, not to commit to immediately moving forward with modifications to criteria. The 2009 biological opinion contains specific triggers for drought exception procedures (Action 1.2.3.C, for example). We assume that these triggers remain in effect because they are included in upstream portions of the RPA, which are included in the baseline. If the intent is to continue to use the existing processes, then it would be helpful to refer to these triggers.

Adaptive Management and Monitoring. Due to the importance of adaptive management to this project, and comments along these lines made by the peer review panel, the broader five agency adaptive management framework document should be included by reference into the BA and BO. In addition, NMFS recommends a meeting to discuss what specific monitoring would be detailed and provided in the BA versus what would be expected as part of the BO.

Oroville BiOp and Action Area. Based on hydrologic analyses that had been provided previous to January 2016, NMFS agrees with the exclusion of the Feather River from the proposed action area. However, NMFS strongly recommends a review of the final operating criteria of the Oroville BiOp, which is nearing finalization, and the production of adequate stand-alone documentation that final operating criteria produce hydrologic results that are consistent with those in the CWF BA.

Spring-Run in South Delta. Analysis of spring-run Chinook salmon has not been done at places (i.e., barge landings, HOR gate, south Delta) where spring-run fish are present. Analyses of project effects in the South Delta should include effects on any spring-run Chinook salmon, including spring-run Chinook salmon that have come from the experimental population area in the San Joaquin River upstream of the confluence with the Merced River, which are part of the listed ESU when in the south Delta. We recognize there are specific take exceptions for the individuals when outside the experimental population area, and recommend discussing the best way to reflect this in the BA.

Effects of Alterations to Clifton Court Forebay (CCF). Changes to CCF due to the splitting into two bays and installation of wall may change the hydrodynamics and predator-prey relationships, which change operations and efficiency of the facilities. The BA has no discussion of the weir structure placed in the intake channel prior to the trash racks and louvers, we expect significant alterations to fish in salvage operations and increases in predation risks.

Additionally, more information needs to be provided noting how the PA and compliance with the OCAP opinion RPA (NMFS IV.4.1 P. 3-5, Table 3.1-1) are linked since the new CCF design alters the existing conditions and it is unknown how the proposed changes in CCF will change hydrodynamics and predation rates in the forebay. Because substantial alterations in the CCF design and hydrodynamics may change the salvage and survival rates, existing studies, working groups, and efforts that address the current RPA may not correctly carry forward to the new conditions.

The BA also needs to identify how operations of CCF are changing, if at all, during construction activities at and within the forebay. Are the given assumptions, relationships, etc., about salvage expansion, predation rates, movement behavior, etc., expected to hold during construction, despite the changes to hydrodynamics that result from construction activities and the modifications to CCF? This information is needed for NMFS to analyze the effect of operations of CCF and any changes in those effects that are due to the construction actions described in the project description.

Outdated Sturgeon Analysis. The temporal and spatial distribution of sturgeon as characterized in the BA is outdated. This therefore defines an inaccurate exposure envelope. Generally, there is reliance on NMFS 2009 BO language that is no longer the current information.

Chinook as Prey Base for SRKW. The BA should include more information to support the analysis and determination for southern resident killer whales. Specifically, the inclusion of a synthesis of Chinook salmon impacts in total which summarizes the various elements of what is analyzed in the other sections (i.e., EFH) and how it all ties together with ocean abundance of Chinook salmon. The BA should include a stand-alone, concise, but thorough explanation of what this project is going to mean in total for salmon in the Central Valley, and why. We recommend further development (perhaps another page or two) of over-arching analysis that encapsulates all the various Chinook analyses together in a way that explains answers to the following questions: All together, do we expect more Chinook salmon in the ocean, or less, or same? If so, how much more, less, or how same? Why do we think that? And what is important to understand about the analysis?

Inter-Work-Window Effects. There is no analysis of effects of structures (perhaps partially completed) during the periods between work windows. For instance, in-water installation of cofferdams may take several years; analysis only covers effects of those structures during the construction period, but there may be effects to species during the period when the work is not occurring –time outside the work window when species are expected to be present in those locations.

HOR Gate. In order to support analysis of the effects of the presence of the operable gate at the head of Old River, especially when closed, the BA should include information on how the structure will affect predation or microcirculation in the vicinity of the river junction. In addition, please clarify the text to make clear that this will not be covered in a subsequent consultation.

Contaminants Exposure. There should be a linking between turbidity effects analysis and the contaminants effects analysis because dredging and pile driving activities that re-suspend sediment may mobilize contaminants and result in effects to the species.

Conservation Value of Degraded Critical Habitat. The BA needs to consider not just the quality of habitat, but its value to the conservation of the species. Therefore even poor quality habitat has a high conservation value if it is the only habitat available to support the species (or if it has the capacity to

develop into higher quality habitat). The BA should consider this when evaluating the effects of bench inundation.

2. Clarifications and additional information requested for complete BA Consultation Package

In-Water Work Timing. For analysis, the BA needs to clarify and be consistent on the proposed timing of in-water work. The BA includes in-water work timing that is beyond the normal in-water work window that NMFS recommends to avoid the risk of adverse effects. NMFS will analyze the timing that is presented in the BA, but warns that work outside of the normal suggested work window is likely to increase the risk of adverse effect. Note that this timing is different for different regions within the action area. A clear and confirmed identification of in-water work timing is needed for NMFS to complete the analysis. If it is expected that work could go beyond the standard recommended window for the region, please identify that so that NMFS can be prepared to define the effects of that extended work.

Time-of-Day Work Timing. Specifics are needed on what time of day work is expected to occur. Page 3-17 notes that “Except where stipulated by an applicable general or specific AMM, proposed work may occur at any time of the day or night.” The BA needs to identify what specific AMMs would deviate from this assumption of constant work. If not provided, NMFS will need to evaluate the work as occurring at all times and additional effects will likely accrue as juvenile salmon behaviors vary greatly depending on the time of day or night.

Definition of Temporary. The BA needs to clearly identify what actions and effects are considered temporary and what are considered permanent. For instance, if the action has a duration of more than two years, it could be considered permanent due to the three-year life cycle of Chinook salmon and the likelihood of effect on the majority of that period.

Dredge Type. In order to analyze the effects of construction of the operable gate at the head of Old River, NMFS will need to know whether dredging is expected to be done using hydraulic or clamshell dredges. If the specifics are not yet known, the BA should include a section that stipulates what conditions would allow for one to be used over another.

Pile Driving Details. For analysis, NMFS needs to know what conditions would require impact pile-driving rather than vibratory to concur with decision points that would require switches in method. For analysis, NMFS will assume that it is impact pile-driving for all actions. The BA also needs to identify clearly the specifics of when pile driving is expected to start and stop at each work location i.e., provide calendar dates.

Concurrent Operations. Clarification on concurrent operations of barges and pile drivers. Barges are in close proximity to each other and may have compounding effects. Concurrent pile driving especially is expected to have highly-destructive acoustics effects.

Maintenance Frequency. Provide information on the frequency of maintenance activities, such as a basic range of frequency or a trigger or threshold that would indicate when the action would occur (e.g., after X inches of sediment accrues at the base of the sheetpile, maintenance dredging will occur). For analysis, NMFS needs information on the frequency of maintenance activities. For instance, is any given activity expected to occur weekly, monthly, annually, or every X years?

Rationale for Operational Criteria. Identify why the operational criteria are identified as given. To assess whether these proposed operations can be expected to provide their intended protections, the BA should state the biological rationale for the operations. This was done for the operations of the gate at the head of Old River, but not for other components of operations. For NMFS to assess whether these proposed operations can be expected to provide their intended protections, the BA should state the biological rationale for all operational criteria.

Three-Day Average. The use of a 3-day average flow for north Delta bypass and OMR determination needs to be justified (and perhaps even further discussed). OMR calculations currently use 5-day and 14-day averages so it is not clear why a 3-day metric is proposed. For the north Delta, NMFS notes that all other components of operations are instantaneous (e.g., sweeping velocity, tidal excursion); it is therefore not clear why a 3-day average is proposed. For both, consider use of a cap on the instantaneous rate.

Update Real-Time Operations Groups. Descriptions of operational groups are outdated. NMFS and CDFW provided an updated list to Principals in March.

Clarify Which Actions Are Expected to Include Take Authorization Under this Consultation or Require Subsequent Consultation. The BA needs to clearly identify which components of the conservation measures are included as part of this proposed action. For instance, the description of restoration actions on levees notes that the actions will be with the permission of the Corps. In order to complete analysis of effects, NMFS needs identification of which items are definitively included in the project description for this consultation.

In order for NMFS to issue take authorization for these components of the project, NMFS needs a more detailed description of the projects in order to quantify that take. If, in contrast, the conservation measure components of the proposed action are expected to be covered by a programmatic consultation, please state that clearly. In that case, we expect that there would be subsequent consultations to include take authorization on specific components with more detail on those components.

NOTE: All page numbers below correspond to the clean version posted to the CWF website, unless specifically noted otherwise.

2.1. Chapter 2 Page Specific Notes

Page 2-3, Table 2-1. Based on previous discussions, it is our understanding that there is some correspondence between the Corps and Reclamation indicating that Reclamation will be the lead Federal agency for purposes of ESA section 7 consultation on the California WaterFix. 50 CFR 402.07 provides that the Services shall be notified of such a designation in writing by the lead agency. Thus, this correspondence is relevant for purposes of demonstrating compliance with 50 CFR 402.07. Please confirm this and add reference to any such correspondence in the table. Please transmit this correspondence to the Services if it has not already been transmitted.

Page 2-6, Table 2-1. The text on page 2-3 provides, "In February 2015, Reclamation and DWR decided to pursue a Section 7 consultation in lieu of the Section 10 permit," which is apparently referring to

Reclamation and DWR's decision to pursue an ESA section 7 consultation on the California WaterFix in lieu of a Section 10 permit on the BDCP. However, this decision is not reflected in Table 2-1. Please revise the table to reflect this decision.

2.2. Chapter 3 Page-Specific Notes

P. 3-2, Table 3.1-1. For “Real-Time Operations” line, NMFS 11.2.1.1, the “revised responsibilities to address the operations of the new facilities” are not defined later in the PA. The PA needs to identify accurately the existing responsibilities and revised new responsibilities of all RTO-associated groups.

P. 3-3, Table 3.1-1. For “Jones Pumping Plant” line, “permitted diversion capacity of 4,600 cfs”, the PA should clarify that this does not allow for more water to be exported in conjunction with the operation of NDD than is permitted by the SWRCB. If more water is going to be permitted, then this needs to be clearly stated in the project description.

P. 3-3, Table 3.1-1. For “Flow” line, NMFS IV.2.3, the BA needs to clarify whether there would still be triggers that would reduce exports if salvage includes listed species in high numbers or densities.

P. 3-4, Table 3.1-1. For “Delta Cross Channel” row, the BA needs to clarify that NMFS IV.1.2 operational criteria are assumed not just in the modeling, but also within the PA operational criteria with no change.

P. 3-6, Table 3.1-1. For “Tracy and Skinner Facilities” rows, responses to comments on these lines refers to a Section 3.4.9, which does not exist. This should be provided with the BA. The BA also needs to clarify the elements of NMFS IV.4.1, IV.4.2, and IV.4.3 that are expected to continue under the PA with no change.

P. 3-17. With regards to “...proposed work may occur at any time of the day or night.” The BA needs to specifically spell out the day/night work window for each component of the project, not just those stipulated as differing from an AMM. Effects depend on the duration of the exposure and periods of non-activity, i.e. night-time recovery periods or periods for movement through work areas.

P. 3-17. With regards to temporary impacts, the BA needs to specify exactly what is considered as “temporary” for salmonids and sturgeon. The sentence “Because all temporary impacts (other than those associated with geotechnical exploration) have the potential to persist for greater than one year and are therefore considered permanent impacts for purposes of analyzing effects on listed species” conflicts with analysis of shorter-term stressors on salmonids and sturgeon later in the BA.

P. 3-20, Table 3.2-2, “AMM9” line. Please confirm and clarify timing of pile driving for each component of the project; the document has different calendar dates for different parts of the PA.

P. 3-23. Regarding “Each geotechnical exploration location will be active for a period from a few hours to 12 workdays.” This is a very large range. The BA should narrow this timeframe or use information from other geotechnical explorations in the area. Otherwise NMFS will be required to analyze effects assuming a duration of 12 workdays.

P. 3-23. Please clarify the overwater drilling period. It is stated here as August 1 to October 31 but on P. 3-25 as June 1 to October 31.

P. 3-25. Please clarify the overwater drilling period. It is stated here as June 1 to October 31 but on P. 3-23 as August 1 to October 31.

P. 3-26. Please clarify how the BA plans to include these criteria from the FFTT in the proposed action, or note clearly that the text in the BA that uses "avoid" is taken directly from the FFTT and is not intended as required "criteria", for the PA.

P. 3-29. The BA should clarify whether the intake design plans to include "juvenile fish habitat elements into the upstream and downstream sheet pile training walls" as was done at RD 2035. This should be considered, given the high amount of sheet piling required for the PA.

P. 3-31, Table 3.2-7. Please clarify the proposed calendar work days for each line of the table, noting recommended work windows and any potential to work beyond those recommendations. The BA should also confirm that the period of work identified in the text matches this table. NMFS will analyze the work period identified in the BA.

P. 3-31. Please note when fish rescues behind cofferdams will happen.

P. 3-32, Section 3.2.2.4.1 Levee Widening notes that the levees near the intakes will be widened on the land side to accommodate the Highway 160 realignment, among other things. The BA should provide more description of the Highway 160 realignment.

P. 3-32, Section 3.2.2.4.2. Regarding "The cofferdams will project from 10 to 35 feet into the river, relative to the final location of the intake screens, dewatering up to 5 acres of channel at each intake site," this is a large range. The BA should indicate what relative proportion of river width this represents.

P. 3-33. Regarding the "5-foot-thick tremie concrete seal", the BA should indicate whether this is permanent or if it will remain through construction (i.e., 3 years). This comment applies generally to all construction components as well. See also "A portion of the cofferdam will remain in place to facilitate dewatering" and clarify whether that cofferdam will it remain in perpetuity.

P. 3-33. The BA should indicate when fish rescues will occur in relation to dewatering. We note that it may be hard to completely seine the water trapped behind the cofferdam wall before dewatering has begun. In general, the BA needs to provide more detail to dewatering actions, including timing relative to other components of the action.

P. 3-34, Section 3.2.2.5. The BA should indicate when the different techniques could be used so that NMFS can correctly analyze the impacts of pile driving. While NMFS can analyze the worst case (i.e., use of impact pile driving for all actions), that is probably not realistic and will likely show a greater effect to the species.

P. 3-37. Please indicate whether there will be any assessment of potentially adverse noise/vibration impacts due to tunneling beneath major migratory waterways during the project.

P. 3-44. Regarding "The IF and the emergency inundation area will have a combined surface footprint of 648 acres, all of which is permanent impact." The BA should indicate what will be impacted (e.g., riparian habitat, riverbed, etc.).

P. 3-45. The last bullet describing CCF work does not match with the proposal to work only within in-water work windows for the Delta. Please clarify which is correct.

P. 3-46, Table 3.2-12. Many of these work windows appear to be continuous and go through the recommended in-water work windows to periods when fish are assumed to be present in the forebay. Construction could very well impact salvage efficiency and predation in the forebay. If construction will only occur during the in-water work windows, the BA should clearly state that.

P. 3-49. The timing of Phase 3-Phase 5 actions appear to overlap with presence of fish (see table 3.2-12) and would be cause for substantial impacts to any fish present during dredging or removal of existing dirt levee. The BA should clarify the timing of these actions.

P. 3-51. Regarding Phase 3, the BA needs to clarify the details of this component. Will the sheetpiles run along the length of the "old" dirt levee embankment, or is something else planned?

P. 3-51. Note that Phase 4 is missing. Clarify whether the ground elevation is going to be set by earthmoving equipment behind the old levee down to design depth in the expanded south CCFB.

P. 3-51. Phase 5. The BA should clarify how a fish rescue will be conducted in the CCF for such a large space efficiently and without high mortality.

P. 3-52, Section 3.2.6.1. The BA notes that the PA entails no changes to the Tracy or Skinner fish facilities. However, the PA does include changes to the inlet with the construction of a flow control structure. Since this is expected to affect fish behavior and salvage, the BA should include an analysis of the effects of this changed structure.

P. 3-54. Regarding "The canal adjoins fishbearing waters, and entails pile driving in or near those waters, for approximately 800 feet along the Banks PP", the BA should indicate whether the sheetpile remains exposed during operations. If so, effect on predation should be assessed.

P. 3-58. The text refers to a fish passage structure associated with the HOR gate. NMFS needs the BA to indicate whether the passage structure will be designed to pass green sturgeon.

P. 3-58. The text refers to a boat lock associated with the HOR gate, but there is no description of details. The BA needs to provide this structure well enough that possible effects to fish can be analyzed, and the BA should include analysis of this structure.

P. 3-59, Section 3.2.8.2.1. The first paragraph of this section states that dredging would occur at a time between August 1 and November 30; this is beyond the standard in-water work window for the Delta, and steelhead may be moving at this time into the San Joaquin basin. The BA should clarify the expected period of work, noting that NMFS will analyze the effects during whatever period is proposed, even outside of the recommended work window.

P. 3-61. Regarding the paragraph that begins with "As described in Appendix 3.B...", please clarify whether this description applies to the HOR gate construction area as well as to the tunnel construction area.

P. 3-66, Section 3.2.10.6. Regarding the sediment reintroduction plan, the BA should indicate whether take is expected to be associated with this plan and, if so, if coverage is expected as part of this BO.

P. 3-67, Footnote 4; P. 3-68 The June 1-November 30 in-water work window for CCF and the south Delta (i.e., HOR gate) overlaps with expected listed fish presence. The BA should clarify and confirm all recommended in-water work windows and periods of expected construction work for the project.

P. 3-68. The BA needs to provide additional details regarding coordination of scheduling and placement of concurrently operating barges to ensure effects are adequately minimized and/or characterized for analysis in the BO.

P. 3-69, Section 3.2.10.9. The BA should provide barge plans that include all project-related barge traffic through the Bay and Delta in order to analyze effects of traffic, propeller entrainment, etc., on fish and critical habitat.

P. 3-71. The information in the paragraph “The barge docks would require pile driving of 24-inch tubular steel piles...” should be clarified given the information in the description of the barge docks in 3.2.10.8. The information in these two passages is conflicting.

P. 3-72, Table 3.2-15 needs to clarify whether the duration of pile-driving is the number of days per year. Clarify whether these actions are expected to be contained to one year, or spread over more than one year (see “CCF Cofferdams” which expects 450 days of pile driving in Year 8).

P. 3-72, Table 3.2-15. The BA should clarify whether pile driving will be consecutive or concurrent and, if the latter, the number of drivers operating concurrently and length of time of concurrent operation.

P. 3-75, Table 3.3-1. The applicant should include the intended functions of the criteria. For instance, to minimize effects to fish, improve water quality, etc. This would better provide NMFS with the information needed to assess whether the selected criteria contributes to the intended goal.

P. 3-76, Table 3.3-1, South Delta operations. Please clarify whether these operations include an upper limit to exports similar to the “no more than 25% above the required OMR levels” that currently applies. For example, for a -5000 cfs OMR limit over a compliance period, instantaneous OMR can be no more negative than -6250 at any point during the compliance period.

P. 3-76, Table 3.3-1, South Delta operations. The BA should clarify whether there are any export reductions to protect listed fish if fish show up in salvage in the south Delta. As this reads, there are no additional actions to protect pulses of fish being entrained into the salvage facilities.

P. 3-81, Table 3.3-2. Under “I. North Delta Diversion Bypass Flows”, NMFS suggests that clarifications be added that “These parameters define the criteria for modeling purposes and provide the real-time operational criteria for levels as operations move between and among levels.”

P. 3-89. Operational criteria for north Delta intakes should state that there will be both biological and physical triggers (such as reverse flow monitoring) that could limit diversions to values below what is prescribed in Table 3.3-2.

P. 3-89, fifth bullet. Please provide information on the monitoring and modeling required to assess whether operations under the proposed action will “avoid increasing the magnitude, frequency, or duration of flow reversals in the Sacramento River at the Georgiana Slough junction above pre-north Delta diversion intakes operations levels” (i.e., the instantaneous timing, duration, and frequency of landward flows without the PA) and how the potential project effects will be projected/simulated to

provide information for management decisions. The BA should include any compliance monitoring for not increasing flow reversals.

P. 3-100. Third Bullet. Please clarify language. “Low-level pumping must be maintained for duration of fish pulse” implies that pumping must stay constant, or not go *lower than* a set level during the fish pulse. Clarify that this really means “Pumping may not exceed low-level pumping for the duration of the fish pulse.”

P. 3-103, Section 3.3.4.1. Regarding “...transported by tanker truck to release sites far away...,” the “far away” is very vague. Please clarify the potential distance range since there are impacts to fish during travel over long distances.

P. 3-103. HOR Gate January operations. The BA should provide procedures for the real-time operations of the HOR gate in January since they are not as clearly specified as for other months.

P. 3-105, Section 3.3.4.3. This seems more like a maintenance related activity. Please clarify that this section should be in operations and not maintenance. While understanding that the action would require changes in operations, so do other maintenance tasks.

P. 3-106. Clarify why the operations of the Mallard Sough, Old River, and Middle River intakes and Los Vaqueros Reservoir are not included in the PA.

P. 3-108, Section 3.3.6 Maintenance of Facilities. Please provide an estimated range of frequency of occurrence, or indication of when the maintenance would be required.

P. 3-108, Section 3.3.6 Maintenance of Facilities. Please indicate in what way the actions have potential to affect listed species.

P. 3-110. Regarding use of remotely operated vehicles or autonomous underwater vehicles, it should be noted that until technology enabling use of remotely operated or autonomous underwater vehicles becomes available, the analysis of effects from maintenance of the tunnels will have to rely on the assumptions associated with the use of equipment that is currently available. Therefore the BA should describe the currently-available equipment and how it is used, particularly as it defines the procedure for routine inspections and the frequency of dewatering events that might be expected to occur in connection with those efforts.

P. 3-112. Restoration of tidal wetland and channel margin habitats will require additional information, and likely will also require separate section 7 consultation at a time when more details become available. The BA reflects this need for future consultation on site selection, site design, and site specific success criteria, but does not provide a framework or time frame for how and when this will be carried out.

P. 3-122, Table 3.4-1. Items in this table (specifically Salmonids Channel Margin Habitat and Tidal wetland for NDD) do not match what is in Chapter 5 P. 5-20. Please clarify and correct the incorrect table.

P. 3-130, first bullet. Please clarify and confirm the in-water work window periods.

2.3. Chapter 5 Page-Specific Notes

Repeated. In the first instance where primary constituent elements are discussed, note that the designations of critical habitat for species use the terms primary constituent element or essential features. The Services' new critical habitat regulations (81 FR 7414; February 11, 2016) replace these terms with physical or biological features. The shift in terminology does not change the approach used in conducting an analysis of the effects of the action on critical habitat, which is the same regardless of whether the original designation identified primary constituent elements, physical or biological features, or essential features. In this BA, we use the term physical or biological features to mean primary constituent element or essential feature, as appropriate for the specific critical habitat. Replace primary constituent elements with physical or biological features in all subsequent critical habitat discussions.

Repeated (specific example on P. 5-3). The BA should confirm and clarify the proposed in-water work periods. The period specified here (August 1 – October 31) is inconsistent with other sections. The proposed in-water work period should also be specific to location.

Repeated (specific example on P. 5-3). Regarding the example text "If present, any listed salmonids or green sturgeon that may be present during the in-water work period would likely be large, active adults and juveniles that are capable of avoiding such disturbances with minimal harassment or risk of injury. Therefore, no direct adverse effects on individual salmonids or green sturgeon are anticipated." Regarding the assumption of large size, the BA needs to provide support for the claim of the size of individuals as well as their ability to swim from disturbances. The former could be reference to a timing table or other info in another part of the BA. The latter could be a reference to literature or evidence from past practices.

Repeated (specific example on P. 5-3, bottom of second full paragraph). Analysis needs to include accurate and updated information on green sturgeon presence. The BA analysis does not consistently include analysis of adult green sturgeon moving back downriver after spawning that could be present during the work window or juvenile green sturgeon that would be rearing in the Delta during the entire year.

Repeated (specific example on P. 5-4). For assessment of effect to critical habitat, the BA should base this determination on the effect to the value of the critical habitat to the conservation of the species. For affected habitat that may currently be of low quality or degraded from historical conditions, that habitat may still be of high value to the species (especially if it is the main migratory corridor), regardless of condition. The BA often incorrectly determines that there is no effect to critical habitat because the action degrades habitat that is already degraded. In all critical habitat effects assessments, the designated critical habitat should not be considered of lesser value to the conservation of the species due to poor quality if it is the only habitat available to the species. In that case, it has a very high value for conservation of the species.

Repeated (specific example on P. 5-5). The BA should better detail both the timeline and the potential effects of the cofferdam closure, dewatering, and fish rescue. Specifically, the BA should contain more detail on how soon after closure the cofferdam will be dewatered to rescue fish, and whether any other construction actions would be occurring during the rescue operations that could affect the rescue actions. Considering that sheet pile cofferdams for the intakes are approximately 2000 feet long and would contain a considerable amount of water to remove, fish may not persist for the length of time

required to dewater. Also, the assessment of species response in the BA should be revised to better characterize the risk of noise-related injury to fish that become trapped in the cofferdammed area at night (when pile driving is assumed to not be happening) and are not rescued before the activities of the next day begin.

Repeated (specific example on P. 5-5, final full paragraph). Conclusions should be revised to reflect consistent, ESA-terminology. If the effects are deemed insignificant or discountable, then the BA should state that as such and use that terminology (rather than “some potential exists”, “negligible”, “primarily similar”, “a low likelihood of adverse effects”, “...unlikely to be affected...”, “...unlikely to significantly affect”, “...considered negligible”).

Repeated (specific example on P. 5-10 and Section 5.2.2.3.3). The BA does not contain information on a framework or measures for mitigation for exposed sediment horizons that contain contaminants and that will remain exposed after construction is completed. The BA and sediment control AMM should identify what will be done with exposed sediment horizons that contain contaminants and remain after dredging is completed and the text should be revised to reflect that ongoing risk to the species.

Repeated (specific example on P. 5-11, Section 5.2.2.3.5). The BA should provide support for determinations by either including references, data sources, or support from the preceding analyses. In this example, the text as written includes no discussion on risks and how they will be prevented, particularly related to contaminated sediments in the river channel.

Repeated (specific example on P. 5-32, Section 5.2.3.5.1.2). The assessment of exposure in the BA should quantify or provide a qualified proportion of the population exposed to the stressor, which is what is required for the effects analysis.

Repeated (specific example on P. 5-14, Section 5.2.2.4.3 and Table 5.2-2). The BA presents challenges to analysis of pile-driving effects based on lack of detail for both activity timing (concurrent or not) and method (impact vs. vibratory). The results of pile-driving represent the worst-case scenario in which all piles are driven with an impact driver with no attenuation. To properly evaluate the most likely effect, NMFS would prefer to evaluate the most-likely scenario. NMFS can analyze the worst case, but it will show an accrual of additional effect. With regards to timing, the results presented in the BA are from a simplistic model that doesn't address convergent and divergent sound waves or reflection or refraction of sound waves from hard surfaces such as levees. It also does not address multiple sound sources in a confined area.

Repeated (specific example on P. 5-15). The BA incorrectly discounts the effects of noise barriers to migrating fish. Regarding “underwater noise levels sufficient to cause injury or mortality would extend across the entire width of the river...”. This text is then followed by “most of the adults and juveniles that are likely to encounter pile driving noise would be actively migrating through the affected reaches, thus minimizing the duration of their exposure...” However, the actively migrating fish must pass through the noise barrier to migrate, and the levels of the noise barrier are sufficient to cause injury or mortality; therefore this is not a minimization of exposure but a barrier to migration behavior. The BA should correct this characterization and revise any determinations or analyses that rely on it.

Repeated (specific example on Page 5-444, lines 20-30). Conclusions that are “no effect” should be reviewed and potentially revised to be “insignificant”, especially if there is a change in conditions and

the magnitude of effect of that change is small. In this discussion of flow-related effects on Central Valley steelhead in the American River a conclusion at the end of this discussion reads, "On balance, these changes in flow are expected to have no effect on Central Valley steelhead holding habitat."

Page 5-2, lines 10-16. The list of PCEs for critical habitat of green sturgeon omits "Substrate type or size," which is a PCE for freshwater riverine systems but not estuarine habitat. "Substrate type or size (for freshwater riverine systems but not estuarine habitat)" should be added in the list on these lines.

P. 5-3. Regarding the example text "If present, any listed salmonids or green sturgeon that may be present during the in-water work period would likely be large, active adults and juveniles that are capable of avoiding such disturbances with minimal harassment or risk of injury. Therefore, no direct adverse effects on individual salmonids or green sturgeon are anticipated." The BA's assumption of 100% avoidance does not adequately characterize the risk to individuals. Some will be unable to avoid and risk physical harm (crushing). The BA should include an analysis of this risk.

P. 5-3, second paragraph. Regarding "not expected to exceed 60 days at any one location." Please specify the work window details for geotech work.

P. 5-3. Because work window for in-water geotech activities extends to when adult steelhead are expected to be present (Sept-Oct), there should be an effects analysis for adult steelhead.

P. 5-3, bottom of second full paragraph. Adult green sturgeon moving back downriver after spawning could be present during this work window. The BA also does not include analysis of juvenile green sturgeon that would be rearing in the Delta during the entire year.

P. 5-3, last full paragraph. The BA should note the expected background conditions, what peak levels of turbidity (NTUs) are anticipated to occur as a result of the PA, and what rate of increase might be expected.

P. 5-3, last full paragraph. The BA should consider whether the effects of in-water drilling could be quantitatively assessed using tools applied to the use of pile driving equipment (spreadsheet analysis of sound exposures).

P. 5-3, last full paragraph. The BA should define or describe the background levels expected (quantitatively), the degree to which the PA may cause those levels to deviate from the background levels, and how rapidly dissipation is expected to occur (expressed as a rate of time).

P. 5-3, end of last full paragraph. As written, this text implies that the harassment would not cause adverse effects. The BA should be corrected to reflect that if fish are present and harassed, that is take regardless of the degree of harassment. The correct statement is that take occurs, but it is not considered to be at a level that will cause injury or death. The BA should reflect that if fish are affected behaviorally by the geotech activities and subsequently move to areas that are less beneficial due to decreased food availability, holding, protection from predation, etc., then the impact is adverse. The BA should attempt to quantify the conditions that would be encountered to cause a fish to want to leave a certain area. Some attempt to describe the exposure envelope must be made. How far must a fish swim to avoid the activity, and how taxing will the exposure be if it is prolonged over time or distance?

P. 5-3. Regarding "direct disturbance of channel sediments and benthic food sources...", the BA should clarify whether this is including effects to recolonization rates of benthic food sources.

P. 5-3. Regarding “these effects are expected to be negligible based on the low intensity,...”. The BA should include quantification or estimation of the number of areas affected, the density of borings per area, the diameter of the borings, the volume of bottom substrate displaced by bentonite backfill, the sound generated by the barges and drilling activities, or other potential metrics by which effects can be measured and assessed.

P. 5-4. Regarding conclusion that geotechnical exploration is not likely to adversely affect salmonids, green sturgeon, or their critical habitat. The BA should base this determination on the effect to the value of the critical habitat to the conservation of the species. Though this habitat may be of low quality, the low quantity of remaining habitat makes it of high value to the species. The small negative impacts of each bore site will add up, especially when there are hundreds of bore sites throughout the Delta.

P. 5-4. Please clarify that the timing identified in “Construction of the three intakes is expected to take 5 years,...” is consistent with all other schedules in the BA (especially Ch. 3).

P. 5-4. The BA should clarify that the entire cofferdam will be installed and closed off within the first season’s work window. This is not articulated anywhere else in the BA.

P. 5-4. Regarding “It is assumed that after the intakes are completed and the cofferdam removed,...” the BA should note how this affects local bathymetry and whether it could create a predator hold where none previously existed.

P. 5-5, second full paragraph. The BA should note alterations of the aquatic and riparian habitat during construction created by the placement of the cofferdam and bankside actions. Impacts created by these alterations will have negative effects to listed fish moving through these areas.

P. 5-5. Regarding “Potential turbidity and sediment impacts on listed fish species and aquatic habitat will be minimized by restricting in-water construction activities to June 1 through October 31,” the BA should revise the conclusion at the end of the section that “no adverse effects are anticipated” given that the quoted text says that impacts will be “minimized”. The conclusion leads one to believe that there is no effect.

P. 5-5. The BA should clarify and confirm when work is expected to occur. This states that in-water construction activities would be limited to June 1 – Oct 31, but other sections (especially the geotech work) use August 1 – Oct 31.

P. 5-5, fourth full paragraph. The BA should be corrected to reflect analysis of proper in-water work window. The text should also acknowledge that the erosion and sediment controls will have to be effective both during and outside the in-water work windows for there to be no effect outside of the in-water construction season.

P. 5-5. The BA should identify whether the “levee clearing” is permanent or temporary, and whether there are any anticipated riparian or cover effects.

P. 5-5. The BA should list out potential effects such as the removal of juveniles stuck in the cofferdammed/dewatered area.

P. 5-5, final full paragraph. “Some potential exists” should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant, then the BA should state that as such and use that

terminology. In this paragraph, the BA should also note the potential effects (e.g., gill irritation) that are being deemed insignificant. Note that that effects cannot be deemed insignificant if a person is able to meaningfully detect, measure, or evaluate them; this applies to a reduction in spawning area, which, as a measureable effect, is not insignificant.

P. 5-5, section 5.2.2.2.1.1. Regarding "...to avoid the primary migration and rearing seasons of anadromous salmonids," the BA should be corrected to reflect that green sturgeon and adult steelhead are present at these times. Or the text should clarify that it is referring to juvenile migration.

P. 5-7. Regarding 25-75 NTUs, the BA should clarify whether this is considered a standard.

P. 5-7, second paragraph. The BA should indicate by how much and for how long the turbidity and suspended sediment levels in the river are anticipated to exceed ambient river levels. The BA could also approximate what distance the turbidity plume is likely to extend to something more precise than "several hundred feet".

P. 5-7, third paragraph. Several phrases make very general statements about the extent and duration of exposures and effects (e.g., limited extent, relatively small, minor disruptions). The BA should quantify these in some way.

P. 5-7, last line. Please describe which invertebrate fauna this is referencing, or provide examples.

P. 5-8, Section 5.2.2.2.2.2. Regarding "Green sturgeon...may be less sensitive to high turbidity...", this is a very speculative statement. Sense of smell and electroreception would allow for enhanced prey detection in turbid waters compared to sight predators, but there are many other potential adverse effects related to increased turbidity levels and suspended sediments (such as contaminants). The BA should remove this text as a species response or provide support for it.

P. 5-8, Section 5.2.2.2.2.2. Regarding "...small spatial and temporal scale of impacts...", this response does not consider what the displaced invertebrate community consists of to begin with, and what they are replaced by after recolonization. The BA should include that information.

P. 5-8, Section 5.2.2.2.3.1. The BA should clarify whether "a low likelihood of adverse effects" is to be interpreted as "discountable" and, if so, the text should be corrected to reflect that. If the effects are deemed insignificant, then the BA should state that as such and use that terminology.

P. 5-8, Section 5.2.2.2.3.1. The risk to individuals should also include that individuals will experience behavioral modification, disruption of migratory patterns, and potential for increased predation in the open water of the channel center away from the shoreline disturbances. This could be an adverse effect that may lead to take and should be reflected in the BA's assessment of risk.

P. 5-8, Section 5.2.2.2.3.2. "...unlikely to be affected..." should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant, then the BA should state that as such and use that terminology. The BA should also include support for this statement, such as a citation to the literature.

P. 5-8, Section 5.2.2.2.4.1. The BA should explain how the physical or biological features (PCEs) are degraded and what effect that degradation would have on the functioning of the physical or biological features (PCEs) in the construction area. The BA should also consider how this would impact the

migratory corridor function of the construction area (i.e., by increasing exposure to mid-channel predators).

P. 5-8, Section 5.2.2.2.4.1. “...unlikely to significantly affect” should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant, then the BA should state that as such and use that terminology.

P. 5-9, Section 5.2.2.3. The BA should also discuss contaminants in the turbidity and sediment section.

P. 5-9, Section 5.2.2.3.2. The BA should outline a sediment profile and contaminants characterization study that will be executed before construction begins and that will be used to develop the AMM. This can be referred to by the sections that assess risk by contaminants (e.g., P. 5-27).

P. 5-10, first line. The previous page notes that many of the chemical constituents preferentially adsorb or attach to organically enriched or fine particles of sediment, and this line states that these sediments are expected to resettle to the bottom relatively quickly. Fine particles, whether inorganic (silt) or organic, take a long time to settle out of the water column, and this statement is therefore incorrect. The BA should correct the statement and any determinations that rely on it.

P. 5-10 and Section 5.2.2.3.3. This section states that the highest risk would occur during in-water construction activities, but the BA does not contain information on a framework or measures for mitigation for exposed sediment horizons with contaminants that will be present (i.e., remain exposed) long after construction is completed. The BA and sediment control AMM should identify what will be done with exposed sediment horizons that contain contaminants and remain after dredging is completed and the text in this section should be revised to reflect that ongoing risk to the species.

P. 5-10, Section 5.2.2.3.4.1. The BA should have a more specific effects description for contaminants. The discussion should focus on the expected types or families of compounds that may be encountered and the toxicological effects and concentrations that would be expected.

P. 5-10, Section 5.2.2.3.4.2. The BA’s assessment of species response should be revised to reflect that, compared to salmonids, green sturgeon are more likely to be exposed given their prolonged presence in the construction area (particularly juveniles). Also sturgeon are in frequent contact with the sediment and any newly exposed horizons would present risk of prolonged dermal contact and ingestion of sediment and forage base.

P. 5-11. The BA should provide more information on which pile-driving method would be used when, or clarify what should be assumed for analysis of effects.

P. 5-11, Section 5.2.2.3.5. “...negligible” should be revised to reflect consistent, ESA-terminology. If the effects are deemed insignificant, then the BA should state that as such and use that terminology. The BA should also provide support for this determination; as written, there is no discussion on risks and how they will be prevented, particularly related to contaminated sediments in the river channel. The BA should correct the species (“salmonids”) referred to in the sturgeon section.

P. 5-11, Section 5.2.2.3.6. The BA should improve the discussions in these sections on impacts to critical habitat. Release of contaminants into the water column either from a spill or exposure of contaminated sediment horizons will have a cascade of effects, including impacts to physio-chemical properties of the exposed habitat, and impacts to both the exposed listed and unlisted species.

P. 5.12, Section 5.2.2.4.1.1. Text states that steelhead adults may be exposed to pile driving noise to a greater extent due to presence in early fall. If steelhead are likely to be in the river at the time piles are being driven, then the BA should include a detailed effects analysis of the action on that life stage.

P. 5-12, Section 5.2.2.4.1.1. Since there is potential for winter-run juveniles to be present in the lower Sacramento River and Delta in October, the BA should clarify whether there is a plan to monitor for winter-run juveniles in the action area during pile driving and, if so, if pile driving would be halted due to winter-run presence.

P. 5-12. Regarding "...identify corrective actions to be taken should the thresholds be exceeded," the BA needs to provide information on what those possible actions are and the extent to which they could correct for any threshold exceedance. If the benefits of these actions are to be assumed, then NMFS requires enough information about them to include them in the analysis of effects.

P. 5-13. Regarding the spreadsheet model developed by NMFS and accounting for the exposure of fish to multiple pile driving strikes, the model does not account for the cumulative effect of multiple pile drivers in concurrent operation. This will likely change the effects. The BA needs to clearly lay out the pile driving schedule to allow analysis of potential cumulative effects of concurrent pile driving.

P. 5-14, Section 5.2.2.4.3 and Table 5.2-2. The results in the text and table represent the worst-case scenario in which all piles are driven with an impact driver with no attenuation. To properly evaluate the most likely effect, NMFS should evaluate the most-likely scenario if that is not the plan. Using vibratory drivers as far as possible and attenuation devices would lessen the effects. NMFS can analyze the worst case, but it will show an accrual of additional effect. The results presented in the BA try to represent a worst-case scenario. However these results are from a simplistic model that doesn't address convergent and divergent sound waves or reflection or refraction of sound waves from hard surfaces such as levees. It also does not address multiple sound sources in a confined area.

P. 5-14, Table 5.2-2. This table should also include information on what year the action is occurring in (e.g., Year 1, Year 2, etc.), and the proximity of these activities to each other. The work schedule needs to be made clearer to determine if effects of multiple actions are overlapping with each other.

P. 5-14, Section 5.2.2.4.3.1. The BA should indicate what proportion of the river would be the area subject to peak SPLs (33-46 feet).

P. 5-15, last sentence of first paragraph. "...if impact pile driving is conduct[ed] concurrently at two or more intake locations...." This is a notable statement that is not characterized in the effects analysis and cannot be captured by NMFS' acoustics spreadsheet.

P. 5-15, Section 5.2.2.4.3.1. The BA should complete the last sentence of the first paragraph of this section.

P. 5-15, Section 5.2.2.4.3.1. The BA should include analysis of effect of sound on delay of migration through the reach with pile driving activities.

P. 5-15, Section 5.2.2.4.3.1. Regarding "underwater noise levels sufficient to cause injury or mortality would extend across the entire width of the river...". This text is then followed by "most of the adults and juveniles that are likely to encounter pile driving noise would be actively migrating through the affected reaches, thus minimizing the duration of their exposure..." However, the actively migrating fish

must pass through the noise barrier to migrate, and the levels of the noise barrier are sufficient to cause injury or mortality; therefore this is not a minimization of exposure but a barrier to migration behavior. The BA should correct this characterization and revise any determinations or analyses that rely on it.

P. 5-15, Section 5.2.2.4.3.1. In discussing the peak SPLs, the BA should include a characterization of the proportion of the river cross-section that would be affected by these noise levels, especially considering that the sheet piles will extend out from the bank into the channel.

P. 5-16, Section 5.2.2.4.3.2. The BA should be corrected in the first paragraph of this section to reflect that post-spawn sturgeon have a high likelihood of exposure either in June or in Sept-Oct. Analyses and determination that rely on this should be revised.

P. 5-16, Section 5.2.2.4.3.2. The BA should correct the risk of exposure described in the last sentence of the first paragraph and in the second paragraph of this section. It is speculative that fish will move during night-time hours (if and) when pile-driving is not occurring. If they do not move at that time and instead attempt to move while pile-driving is occurring, the ability to swim swiftly does not reduce their exposure considering that that acoustic barrier spans the width of the channel. This assessment also does not consider rearing or holding fish that are not moving quickly through the reach and may therefore be exposed to the noise stressor several times (text on P. 5-17 refers to the intake reach as primarily a migratory corridor, which is speculative since there is little science indicating where juveniles may be rearing).

P. 5-17, Section 5.2.2.4.4.1. This section should describe the effects of the action on critical habitat. Instead it describes the effects to individuals (e.g., “potential injury and behavioral effects”). This text should describe the effect of the action on the value for conservation of the species for each PBF, such as migratory corridor temporarily impacted, permanent impacts to river channel (via X feet of permanent impacts).

P. 5-17, Section 5.2.2.4.4.1. The final sentences of this paragraph discuss multiple concurrent driving activities, and should be included on P. 5-15.

P. 5-17, Section 5.2.2.5. Cofferdam installation is proposed to take place between June 1 – October 31 to “avoid the peak abundance of listed fish species.” The BA needs to identify the proportion of the population that would therefore be exposed to the action.

P. 5-18, Section 5.2.2.5.2.1. The BA should include each exposure assessment with at least the following level of detail: A low risk for most spring-run and winter-run adults and juveniles based on timing, but an elevated risk in Sept. and Oct. for steelhead due to the peak of the timing of their upstream migration.

P. 5-18, Section 5.2.2.5.2.1 and beginning of 5.2.2.5.3.1. Regarding “...migrating adults and juveniles that would be expected to avoid or move away from active construction areas, minimizing their risk of being stranded.” The BA should revise this response to reflect that this may be true during daytime hours, but not for nighttime hours, when fish may use the structure to hold against the river current and then become entrapped during construction the next day.

P. 5-18, Section 5.2.2.5.3.1, first sentence. The BA should contain more detail on how soon after closure the cofferdam will be dewatered to rescue fish, and whether any other construction actions would be occurring during the rescue operations that could affect the rescue actions. Considering that sheet pile

cofferdams are approximately 2000 feet long and would contain a considerable amount of water to remove, fish may not persist for the length of time required to dewater.

P. 5-19, Section 5.2.2.5.3.2. The BA should revise this conclusion based on sturgeon behavior vs. salmon behavior. Sturgeon are likely to go to the deepest section of the cofferdam area being dewatered and would likely only be seen at the very end of the dewatering process. Salmon would likely be observed milling around in the enclosed cofferdam and more easily captured.

P. 5-19, Section 5.2.2.5.4.1. The text notes that the potential for stranding would have an adverse effect on the PCE [PBF] of designated critical habitat, but does not state which PCE/PBF is affected. The BA needs to identify which PCE/PBF is affected.

P. 5-19, Section 5.2.2.6.1.1. For assessing exposure, the BA should identify the fraction of the population that is exposed during the work window.

P. 5-19, Section 5.2.2.6.1.2. For assessing exposure, the BA should be corrected to identify the fairly high potential for downstream adult migrants and rearing juveniles to encounter cofferdam construction during the construction window.

P. 5-20, Section 5.2.2.6.3.1. The BA should include references, data sources, or support for the risk assessment.

P. 5-20, Section 5.2.2.6.4.1. The text concludes that the effect on CH is a temporary adverse effect. Considering that this is for the construction of the diversions and the effect on the habitat within their footprint, the effect is permanent. The BA should reflect that.

P. 5-21, top four lines. The text states that unavoidable impacts will be offset through restoration at an approved restoration site or conservation bank. The BA should identify whether/how this will offset the losses in the main migratory corridor for the impacted species, noting that in-kind and in-place restoration should be the first option.

P. 5-21, Section 5.2.2.7.1. This section identifies species exposure during construction, but the BA should also include exposure to the completed intakes given the modification to habitat associated with the structures.

P. 5-21, Section 5.2.2.7.2.1. The text reads that the PCEs in this area are “degraded from historical conditions, and are unlikely to support high densities of juvenile salmonids.” Regardless of this judgement, the BA should consider this habitat as high in value to the conservation of the species because it is the main migratory corridor for these species. In all critical habitat effects assessments, the designated critical habitat should not be considered of lesser value to the conservation of the species due to poor quality if it is the only habitat available to the species. In that case, it has a very high value for conservation of the species.

P. 5-21, Section 5.2.2.7.2.1. The BA incorrectly discounts the value of the existing habitat to the conservation of the species, which is high despite the habitat condition being low. The BA should state and consider that although the quality of the habitat is severely degraded, as the only remaining habitat in the main migratory corridor, it has a very high conservation value. The loss or modification of this habitat is not trivial, even though the habitat may be degraded.

P. 5-21, Section 5.2.2.7.2.2. The BA should also include downstream-migrating adults, which could use this area. The BA incorrectly discounts the value of the existing habitat to the conservation of the species, which is high despite the habitat condition being low. If this area is “low-quality”, the BA should provide support for that characterization.

P. 5-22, Section 5.2.2.7.3.1. The BA should consider in this assessment of risk that replacement of shoreline habitat (which is not mitigated on site) with sheetpile does not provide beneficial ecological function to listed fish; considering that the existing shallow water habitat will be reduced/degraded, and shallow water is a key rearing (for growth) location for juvenile salmonids, this activity would affect growth of juveniles.

P. 5-22, Section 5.2.2.7.4.1. The first sentence states that impacts to designated critical habitat include impacts on adult migration and juvenile rearing and migration habitat, but Section 5.2.2.7.3.1 concludes that there are negligible effects on migrating adults. Please clarify and correct.

P. 5-22, Section 5.2.2.7.4. The BA should provide the classification of channel margin and tidal marsh habitat. The BA should not consider there to be “no long-term effects” on the conservation value of the critical habitat due solely to the plan to offset impacts at some other location. The BA does not identify that the offsetting efforts would be in the same area (i.e., the main migratory route of Central Valley salmonids) in order to provide the value to the conservation of the species. Additionally, offsetting does not mean that there will be no long-term or even temporary effects to the critical habitat directly impacted.

P. 5-23, Section 5.3.2. This effects analyses describes the construction of the barge facilities, but not describe the actual use of the facilities and the associated vessel traffic (e.g., loading and unloading of equipment, etc.). The BA should include a section that evaluates the effects to the listed fish and their habitats of actually using the barge docks. Propeller strikes are a significant cause of sturgeon mortality for adults; this project is expected to have significant barge traffic, and those effects need to be analyzed.

P. 5-23, Section 5.2.3.1. The BA should indicate what proportion of the corridor is covered by the 30 ft – 50 ft barge dock.

P. 5-24. The BA (or the erosion and sediment control AMM) should include information indicating whether erosion control measures include monitoring at times outside of the in-water work window period.

P. 5-24, Section 5.2.3.2.1.1. The exposure assessment in the BA is incorrect regarding access to the Delta. “Current water management and gate operations” would only affect diversion of fish into the DCC; there are no physical permanent management operations (i.e., gates) that affect diversion of fish into Georgiana Slough, Three Mile Slough, or the mouth of the San Joaquin River. The BA should state that the DCC gates are open from June to Oct 31 (except for special circumstances), which is the same time that in-water construction activities would be occurring in the Delta. Therefore there is potential for any fish present in June to be diverted into the DCC and exposed to the action.

P. 5-25, Section 5.2.3.2.3.1. “...disruptions...are expected to be brief and unlikely to cause adverse effects” should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant, then the BA should state that as such and use that terminology.

P. 5-25, Section 5.2.3.2.3.2. The BA should provide information on and consider the effects of increases in turbidity and suspended sediment on temporary reductions of prey availability in juvenile rearing habitat in the Delta. The text in this section does not apply to juveniles (“large sizes”).

P. 5-25, Section 5.2.3.2.4.2. For clarity, the PCEs should be listed here (e.g., migration corridor, rearing habitat, etc.). PCEs should also be changed to PBFs.

P. 5-26. This section of the BA should also include identification and discussion of additional controls of resuspended contaminated sediments that may result from barge movements and prop wash.

P. 5-26, Section 5.2.3.3.1.1, last sentence. The BA should also include discussion of risk to species outside of the construction season due to exposed sediment horizons and effects of channel flows and vessel traffic.

P. 5-26, Section 5.2.3.3.1.2. The BA should clarify whether “construction period” refers to just the in-water construction season or the several-year-long periods. The BA should be corrected to reflect that both adult and juvenile green sturgeon are present in the waterways of the Delta and can be present year round. The risk should not be expected to be lower for fish in the Delta. Contaminants that settle down-current from the construction site would be exposure risks outside of the construction season.

P. 5-27, Section 5.2.3.2.3.1. “...considered negligible” should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant or discountable, then the BA should state that as such and use that terminology.

P. 5-27, Section 5.2.3.3.3. The risk assessments in the BA should not be considered “negligible” because there is a lack of information. The BA should include identification of potential risk (are there other studies in the area that could provide at least a rough idea of what potential contaminants are could be present?) and a commitment to refining that risk assessment after completion of geotech investigations that are associated with construction.

P. 5-27, Section 5.2.3.3.3. The risk assessments in the BA do not maintain consistency with the pathway described in the species response section – particularly the bioaccumulation of contaminants through the foodweb, and especially for sturgeon based on their feeding.

P. 5-27, Section 5.2.3.3.4.1. The BA should clarify whether this section refers to designated critical habitat of just CCV steelhead or all salmonids.

P. 5-27, Section 5.2.3.3.4.1. This statement provides generalities and therefore does not adequately define the effects. The BA should provide information, both here and in other similar sections, that indicates understanding of what the effects are going to be and what their magnitude is.

P. 5-28, first full paragraph. The BA should indicate how the effects of overlapping fields of noise were modeled; this may equate to a fairly extensive area of noise for a prolonged period of time.

P. 5-28, second full paragraph. The BA should clarify whether this section is discussing all salmonids or just steelhead, since this paragraph is specific to steelhead. The BA should also identify that steelhead may be staging in the Delta during this time while waiting for proper conditions to migrate upstream, and that green sturgeon will be present at this location (year-round for juveniles). Same comment applies for Section 5.2.3.4.1.1.

P. 5-28, Section 5.2.3.4.1.1. The BA needs to clarify whether the exposure for juvenile salmon and steelhead is just in June, as stated in this paragraph, or June and July, as stated previously in other sections of the BA.

P. 5-30, first paragraph. The BA should include information on concurrent noise sources if that could be expected to occur. The BA should also identify and discuss the impact of potential acoustic blockage of the entire channel.

P. 5-30, Section 5.2.3.4.3.1, first paragraph. The peak SPLs are for single sources of noise. The BA should include information on concurrent noise sources if that could be expected to occur. The BA should also identify and discuss the impact of potential acoustic blockage of the entire channel.

P. 5-30, Section 5.2.3.4.3.1. Second full paragraph discusses HOR gate instead of barges, and is limited to steelhead. Please clarify that this is the right text for this section.

P. 5-30, Section 5.2.3.4.3.1. End of second full paragraph discusses use of floating docks. The BA should specify the reduction in piles needed, or provide decision that analysis should include analysis of effects if floating docks are *not* used.

P. 5-30, Section 5.2.3.4.3.2. The BA should correct the statement in this section that risk is low for adults. Most barge locations are in the central and southern Delta; post-spawning adults could enter the DCC in summer and move throughout the Delta, therefore being exposed and acquiring a risk.

P. 5-31, first five lines. The BA analysis should include that, even with the monitoring, the zone of sound that will have levels that could cause injury or death is several thousand feet wide, essentially blocking wide portions of or the entire channel of south Delta waterways. Analysis cannot rely upon the cumulative noise thresholds to reduce risk; the cumulative noise threshold gives NMFS a way to quantify take, but not necessarily reduce it.

P. 5-31, Section 5.2.3.4.4.1. The BA should confirm that the effects would occur for up to 13 days per season; this seems to require continual pile driving with multiple piles at each site. The assessment of risk in the BA should specify if activities are happening at all of the sites at the same time, whether there is potential for multiple exposures to different pile driving sites over the proposed work period, etc.

P. 5-31, Section 5.2.3.5.1.1. The BA should be corrected (here and in similar places) to properly reflect the peak steelhead adult migration time and risk of exposure. As written the text implies that Aug-Oct are secondary; this period (Sept-Oct) is actually the peak steelhead adult migration time in the Delta.

P. 5-32, Section 5.2.3.5.1.2. The assessment of exposure in the BA should include that adult post-spawning green sturgeon enter the DCC during the in-water work window and are exposed to the actions. The BA text does not quantify or provide a qualified proportion of the population exposed, which is what is required for the effects analysis. Analyses and determination that rely on this should be revised.

P. 5-32, Section 5.2.3.5.2. These assessments should include evidence or support for the assumptions that fish present in the action area at this location are expected to be large.

P. 5-32, Section 5.2.3.5.3. The BA should specify when fish rescues behind cofferdams would occur. The BA text discounts effects of rescue to fish, but does not consider the higher risk to adult steelhead based on their timing in the area.

P. 5-33, Section 5.2.3.6.1.1. See previous comment on potential exposure of adult steelhead that may be staging in the Delta.

P. 5-33, Section 5.2.3.6.1.2. See previous comment on exposure of post-spawning adults.

P. 5-33, Section 5.2.3.6.2. and Section 5.2.3.6.3. The species response in the BA does not provide support for the assumption that fish will be large and will avoid the action. The BA should consider the record of propeller strikes to sturgeon.

P. 5-34, Section 5.2.3.7. The BA should confirm that barge landings are not within the critical habitat of Chinook salmon species. The text on P. 5-34 conflicts with barge dock information in Section 3.2.10.9, which states that docks will be needed at Intake 2 and the IF, and perhaps Intakes 3 and 5, all of which are located on the mainstem Sacramento River and within the designated critical habitat of spring-run and winter-run Chinook salmon.

P. 5-34. The text states that unavoidable impacts will be offset through restoration at an approved restoration site or conservation bank. The BA should identify whether/how this will offset the losses in the main migratory corridor for the impacted species, noting that in-kind and in-place restoration should be the first option.

P. 5-36, Section 5.2.3.7.4.1. It is not clear why the effects to critical habitat from barges is considered permanent.

P. 5-35, Section 5.2.3.7.2.1. The text reads that the PCEs in this area are “degraded” and that the action will not substantially degrade it further. Regardless of this judgement, the BA should consider the value of the habitat to the conservation of the species. In all critical habitat effects assessments, the designated critical habitat should not be considered of lesser value to the conservation of the species due to poor quality if it is the only habitat available to the species. In that case, it has a very high value for conservation of the species.

P. 5-35, final paragraph. The BA should provide support for the conclusion that adult and juvenile salmonids would avoid the barge landing sites.

P. 5-35, final paragraph. The assessment in this paragraph (that the action would result in localized reductions in benthic food production) is inconsistent with the assessments in the beginning of the previous paragraph (that the action is unlikely to substantially degrade the habitat). The BA should correct and clarify.

P. 5-36, Section 5.2.3.7.2.2. The BA should provide a determination of the overall impact on critical habitat.

P. 5-37. The text states that unavoidable impacts will be offset through restoration at an approved restoration site or conservation bank. The BA should identify whether/how this will offset the losses in the main migratory corridor for the impacted species, noting that in-kind and in-place restoration should be the first option.

P. 5-37, Section 5.2.4.1. The BA should clarify whether HOR gate construction is to prevent migrating juvenile salmonids, generally, from entering Old River, or just steelhead, as stated later.

P. 5-37, Section 5.2.4.1. The BA needs to include analysis of the boat lock component of the HOR gate for effects on species (for instance, what is the risk of fish being trapped in it, and what are the processes for their rescue?).

P. 5-37, Second full paragraph. This paragraph does not include mention of minimization of effects to sturgeon and adult steelhead.

P. 5-38, Section 5.2.4.2.2.1. Please clarify whether this affects salmonids generally or just steelhead.

P. 5-38, Section 5.2.4.2.2.1. Regarding the rapid movement of steelhead through the Delta, the BA should provide support for this assessment. If this is not a supported response then the analysis does not accurately characterize the response of the species.

P. 5-39, top lines. The assessment of response in the BA for steelhead is not accurate. Though smolts may be migrating (rather than rearing) through Old River near the HOR gate, migrating smolts still need to eat and survive. Lack of food or adequate habitat function would compromise this. The BA needs to provide supporting data for this conclusion.

P. 5-39, Section 5.2.4.2.3.1. "...negligible" should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant, then the BA should state that as such and use that terminology.

P. 5-39, Section 5.2.4.3. The BA should also include discussion of risk to species outside of the construction season due to exposed sediment horizons and effects of channel flows and vessel traffic.

P. 5-41, Section 5.2.4.3.3. The risk assessments in the BA should not be considered "negligible" because there is a lack of information. The BA should include identification of potential risk (are there other studies in the area that could provide at least a rough idea of what potential contaminants are could be present?) and a commitment to refining that risk assessment after completion of geotech investigations that are associated with construction.

P. 5-42, Section 5.2.4.4. Second paragraph should include that adult steelhead and potentially juvenile green sturgeon could still be exposed.

P. 5-42, Section 5.2.4.4.1.1. The BA should remove "some" and reflect that exposure risk is significant for steelhead, even if they are in the mainstem San Joaquin River, because all SJR basin steelhead will pass through the construction area and zone of influence.

P. 5-44, Section 5.2.4.4.3.1. The BA should correct the assessment of risk to properly characterize steelhead presence during the August 1 – November 30 work window (which should be corrected to end on Oct 31). Adult Sacramento steelhead peak migration is Sept-Oct; south Delta migration is more uncertain, tending to peak in Dec-Jan, but can begin as early as Oct.

P. 5-44, Section 5.2.4.4.3.1. Migrating fish must pass through the noise barrier to migrate since the pile driving will block the entire width of Old River and perhaps even the San Joaquin River. The noise levels are a barrier to migration behavior. The BA should correct this characterization and revise any determinations or analyses that rely on it. Similar comments apply to Section 5.2.4.4.3.2.

P. 5-45. Section 5.2.4.5.2. The assessment of species response in the BA should be revised to better characterize the risk of noise-related injury to fish that become trapped in the cofferdammed area at night (when pile driving is assumed to not be happening) and are not rescued before the activities of the next day begin.

P. 5-48. Section 5.2.4.7.2.1. The BA should include that HOR gate construction precludes permanently any improvements to critical habitat relative to current conditions in that area.

P. 5-49, Section 5.2.4.7.2.2. The BA should include data to support the conclusion that sturgeon would likely be unaffected by changes in hydraulic conditions, especially considering that sturgeon may hesitate to volitionally pass through the gate structure when it is open, and are also not likely to use the fish ladder that is designed for salmonids when the gate is closed.

P. 5-49, Section 5.2.4.7.4. The text states that impacts will be offset through restoration at an approved restoration site or conservation bank. The BA should identify whether/how this will offset the losses in the main migratory corridor for the impacted species, noting that in-kind and in-place restoration should be the first option.

P. 5-50, Section 5.2.5. The BA should also include discussion of risk to species outside of the construction season and after construction due to exposed sediment horizons and effects of channel flows, wind, or other mixing drivers.

P. 5-50. The BA should note the datum from which elevation is measured.

P. 5-50, Section 5.2.5.1. The work window is skewed to avoid juvenile salmonids. The BA should include text that describes that green sturgeon juveniles can be present year-round, and adult steelhead would be expected in the area in Sept-Nov.

P. 5-52, Section 5.2.5.2.1.2. The BA can mention the peak of juvenile green sturgeon in salvage in the summer to support characterization of juvenile green sturgeon presence in the Delta at those times.

P. 5-53, top lines. The determination that the action would have “no measureable effects on growth or survival because the affected area represents a small proportion of the total amount of ...habitat available” should be supported by something to indicate that is so. Otherwise, regardless of the size of the area, fish are considered to be affected because they use the area. The same comment applies to other similar language in other sections.

P. 5-53, Section 5.2.5.3. The BA should also include discussion of risk to species outside of and after the construction season due to exposed sediment horizons and effects of channel flows and mixing due to wind, etc.

P. 5-55, Section 5.2.5.3.3.2. The risk assessments in the BA do not maintain consistency with the pathway described in the species response section – particularly the bioaccumulation of contaminants through the foodweb, and especially for sturgeon based on their feeding.

P. 5-55, Section 5.2.5.4. The BA should provide more analysis of the spatial extent of injurious noise levels, especially given that the project involves several years of pile driving in multiple locations.

P. 5-58, Section 5.2.5.4.3.1. The BA should clarify why the second paragraph in this section discusses only steelhead and does not discuss the risk to Chinook salmon.

P. 5-61 Section 5.2.6.1.2. Please correct to reflect effects to direct physical injury, not stranding.

P. 5-65. Regarding “Restriction of in-river activities to these months would avoid the peak migration and rearing seasons of listed salmonids with the exception of adult steelhead, which may peak in abundance in the action area during the late summer and fall months (September–October).” The BA should consider that fish may be present despite it not being the “peak” migration period, and include analysis of effects of exposure to the proportion of the population that is exposed during this time.

P. 5-65, third full paragraph. The BA should confirm that in-river maintenance dredging and riprap replacement will also be restricted to the in-water work window.

P. 5-66, Section 5.3.2. The BA should clarify why in-water dredging is required for maintenance of barge landings.

P. 5-66, final full paragraph. The BA should clarify inclusion of frequency along with “location and timing” of dredging activities. Frequency was included in previous similar sections describing dredging activity. Likewise for P. 5-68 (last paragraph).

P. 5-70, Section 5.4.1.2.1.1.1. The BA should include updated information on temporal occurrence, including monitoring data with genetic identification at Chipps Island and information on life-stage occurrence based on recent otolith studies.

P. 5-72, Section 5.4.1.2.1.1.2. The BA should include occurrence of strays in Colusa Basin Drain. The geographic description of occurrence could be simplified to include all waterways of the north Delta and some waterways of the south Delta.

P. 5-73, Section 5.4.1.2.1.2.2. The BA should include the presence of spring-run Chinook salmon (and “spring-running salmon”) in the San Joaquin River and south Delta tributaries. These are included in NMFS’ 5-year status report. Reliance on the NMFS 2009 OCAP BO (p.337) is inaccurate since presence and anticipation of occurrence has changed since that BO was issued.

P. 5-76, Section 5.4.1.2.1.6. This should include exposure of spring-run Chinook salmon that will be exposed to the HOR gate (see general comment on Spring-run in the South Delta above).

P. 5-76, Section 5.4.1.3.1.1.1. Please clarify that the “NDD will be provided with fish screens” except during maintenance.

P. 5-94, Section 5.4.1.3.1.1.2.2. The BA should clarify that the benefits of Localized Reduction of Predatory Fishes are not to be considered, especially given the high uncertainty of the outcome of that conservation measure. If it is to be considered, the BA should provide estimates of proportionate decrease in predation or increase in survival, based on other studies.

P. 5-95, Section 5.4.1.3.1.1.4, last sentence. The PA should correct this characterization of salmonid behavior and remove the text citing the NMFS 2009 OCAP BO (p.406). NMFS 2009 was referring to intermittent openings of the DCC; the text in 5.4.1.3.1.1.4 is referring to differences in the number of days that DCC is open, but does not indicate whether these would be considered intermittent or multi-day openings (the information does not indicate number of consecutive days) and therefore whether the conclusion would be supported by the text from NMFS 2009. The BA should also provide better support and reasoning for the determination that effects to steelhead adults would be minimal.

P. 5-98, Section 5.4.1.3.1.1.7.2. This section primarily discusses water hyacinth and uses examples of effect risks based on removal of water hyacinth (which can be blocked by a floating barrier). The BA should include evaluation of effects of removal of *Egeria*, which is the primary water weed in CCF.

P. 5-102. Regarding "...including real-time operations that would be done in order to limit potential operational effects to avoid jeopardy...", confirm that this is a reference to the 2009 NMFS OCAP opinion.

P. 5-109. The BA should include updated information from USGS et al. regarding the critical streak line and how that and flow relate to proportion of fish entering Georgiana Slough.

P. 5-110. Regarding "in December to May are discountable because the gates are usually closed in these months...", the BA should note that this likely does not occur in very dry years or periods of drought.

P. 5-113. Regarding "...but only analyses for the former have been published...", the BA should refer to the additional unpublished results.

P. 5-122. Regarding "A similar or marginally greater (1-2%) proportion of fish used the interior Delta migration route...", the BA should clarify the potential number of fish that this could translate to.

Page 5-146, footnote 23. This footnote provides, "It is acknowledged that an index of 0.05 is an arbitrary choice, but one that seemed reasonable." This phrase raises the question whether using this index is "arbitrary" under the Administrative Procedure Act (APA; see 5 U.S.C. 706(2)(A)). If using this index is "arbitrary" under the APA, then the index should not be used. However, if there is sufficient rationale to support a conclusion that using the index is reasonable under the circumstances, then that rationale should be expressed here, and using the index should not be characterized as "arbitrary." We suggest that "arbitrary" be deleted.

Page 5-162, Section 5.4.1.3.2.2.1. This section includes text from NMFS (2009) that provides, "ongoing acoustic tracking studies should provide more detailed information on the movements of this life stage in the Delta," but the BA should include any updated information on the results of such studies.

Page 5-171, Section 5.4.1.4. This section provides, "[This section intentionally left blank for purposes of easy incorporation into the Biological Opinion.]" This section is incomplete; this section should include text assessing the risks to individuals.

Page 5-403, lines 19-22. This section of the BA relates to flow-related effects on pre- and post-spawn adult holding for green sturgeon. "Overall, the changes in flow are not expected to affect green sturgeon holding habitat. Although reductions in flow during the holding period would be somewhat greater than increases in flow, they would occur during wetter year types, which would reduce their impact." These two sentences appear to be inconsistent. The second sentence acknowledges that there would be some effect, albeit reduced, in wetter year types. However, the first sentence provides that changes in flow are not expected to affect green sturgeon holding habitat. These sentences should be revised to be consistent.

P.5-413. Please confirm that any cut-and-paste from the winter-run section has corrected information (especially note that the increased risk of redd dewatering in June and August is the same as for winter-run, and does not match the information for spring-run on P. 5-280).

P. 5-415, Section 5.4.2.1.5. The BA should be revised to reflect consistent, ESA terminology. If the effects are deemed insignificant or discountable, then the BA should state that as such and use that terminology, rather than “predominately similar” or “small to negligible”. Also, these effects should be noted as being positive or negative.

P. 5-427, Section 5.4.2.2.3.1.1.2. The BA should indicate in which month and water year type the flows are more than 19,350 cfs at Hazel Avenue for both the PA and NAA.

P. 5-445, line 5. Text discusses effects in June; the BA should confirm that this is the correct month and that it shouldn’t be Oct or Nov.

P. 5-446, Section 5.4.2.2.5. The BA should revisit the effects to critical habitat, especially considering that there are increased temperature effects in certain years and months that do not seem to be reflected in this determination.

P. 5-455, Section 5.5.2.3.1.2. Regarding “...capture of green sturgeon by electrofishing or gillnetting is unlikely,” the BA should correct this or provide support that it is true; sturgeon are expected to be more susceptible to electrofishing due to their larger size compared to salmonids.

P. 5-458, top lines. The BA should be corrected to reflect that green sturgeon do not have poor hearing and in fact use sound to communicate.

P. 5-F-19, Section 5.F.4.1.4. Please clarify if the “<0.072ug/L increase” is the average across all locations.

P. 5-F-25, Section 5.F.4.2.3. This determination should use ESA terminology such as insignificant or discountable for assessment of risk to critical habitat. The BA should also identify and briefly describe the potential effects to each of the PBFs of the critical habitat that may be affected by Se concentrations.

P. 5-F-26, second and third bullets. Regarding “...update to particulates may be over- or under-estimated.” The BA should specify which of these is correct, or, if implying that there is uncertainty in the results indicate the general magnitude of confidence interval around the results.

2.4. Chapter 7 Page-Specific Notes

Repeated (specific example on Page 7-3 (track change version), line 25). The heading in this line and text in the discussion underneath this heading refers to the “Changing Baseline.” It is unclear what this phrase means and how it is relevant to the BA. The BA should include a discussion of the environmental baseline as defined in 50 CFR 402.02. If this heading is intended to refer to the environmental baseline, BOR and DWR should revise it accordingly. If not, BOR and DWR should clarify to what “the Changing Baseline” is referring and why.

Repeated (specific example on Page 7-3, lines 41-42 (track change version)). Text on these lines provides that the net effect of cumulative effects “is to approximately maintain current conditions for the foreseeable future.” Ken Bogdan, DWR, commented: “This seems conclusory – is there a way to back it up with any substantial evidence? Doesn’t the latest salmon population numbers indicate that things are getting worse related to “current conditions”?” There were apparently no revisions to this

text to address this comment. BOR and DWR should revise this text to address this comment or explain why this text was not revised.

Repeated (specific example on Page 7-4, lines 26-29 and Page 7-16, lines 8-11). The sentence on these lines provides, “The PA will not appreciably diminish the value of Sacramento River winter-run Chinook salmon designated critical habitat to the conservation of the species due to the implementation of avoidance and minimization measures.” Based on a recent revision (81 FR 7214; February 11, 2016), 50 CFR 402.02 provides, in relevant part, “Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species.” Thus, the conclusion in this sentence relates to a conclusion of whether the proposed action is likely to destroy or adversely modify critical habitat. NMFS will conclude in the biological opinion whether the proposed action is likely to destroy or adversely modify critical habitat. This conclusion is not supported by the analysis in the BA, which does not discuss the value of critical habitat for the conservation of listed species, and this conclusion should not use the phrase “appreciably diminish the value . . . of critical habitat for the conservation of the species” in the BA. BOR and DWR should revise this text accordingly.

Repeated (specific example on Page 7-5, lines 13-18 (track change version)). The sentence on these lines provides, “As described in Section 5.4.1.5, Effects of the Action on Designated Critical Habitat, within the Delta, RTOs would minimize the potential for adverse effects to PBF 7, downstream access, for juvenile winter-run Chinook salmon (e.g., from reduced Sacramento River flows downstream of the NDD influencing probability of survival because reduced transit speed), and the Georgiana Slough NPB would mitigate for near-field and far-field effects of the NDD on PBF 7.” However, Section 5.4.1.5 does not clearly describe how RTOs would minimize the potential for adverse effects on critical habitat. In addition, Section 5.4.1.5 does not contain any discussion of the Georgiana Slough NPB and how that would “mitigate” for near-field and far-field effects of the NDD on critical habitat. Finally, as noted in a comment by Kenneth Bogdan, DWR, regarding this sentence, the discussion should focus on how effects on critical habitat would be avoided or minimized rather than whether the Georgiana Slough NPB would “mitigate” such effects. BOR and DWR should provide more sufficient support in the BA for the conclusion that real-time operations minimize the potential for adverse effects to critical habitat. In addition, BOR and DWR should clarify both here and in section 5 how the Georgiana Slough NPB would avoid or minimize near-field and far-field effects of the NDD on critical habitat or that conclusion should be deleted here.

Repeated (specific example on Page 7-7, lines 8-13 (track change version)). The sentence on these lines provides, “Identified operational effects would be mitigated with restoration of channel margin habitat (Section 5.4.1.3.1.2.2.1.2, Operational Effects), installation [sic] a nonphysical barrier at the Sacramento River-Georgiana Slough divergence (Section 5.4.1.3.1.2.1.2.2, Nonphysical Fish Barrier to Georgiana Slough), and localized reduction of predatory fishes (Section 5.5.2, Localized Reduction of Predatory Fishes to Minimize Predator Density at North and South Delta Export Facilities).” First, it is unclear to which identified operational effects this sentence is referring. BOR and DWR should clarify to which identified operational effects this sentence is referring. Second, it is unclear what “mitigated” means in this sentence. BOR and DWR should clarify what “mitigated” means in this sentence or revise the sentence to clarify how the subject operational effects will be avoided or minimized. Third, as described

in a comment on Chapter 5, Section 3.4.4.1.1.1, at page 3-138, lines 35-38, the BA provides, “Due to the uncertainties regarding the approach for implementation of the predator reduction AMM, incidental take authorization for this AMM will be secured through a Section 10(A)(1)a [sic] scientific collection permit, or through a separate Section 7 consultation, to be performed at the time the initial feasibility assessment study is begun.” Based on this text quoted from Section 3.4.4.1.1.1, it is unclear why there is any analysis of the effects of implementation of predator reduction in this BA. BOR and DWR should clarify whether BOR and DWR intend to consult on the effects of implementation of predator reduction in this CWF consultation. If not, BOR and DWR should revise Sections 5 and 7 to remove discussion of effects of implementation of predator reduction.

Page 7-16, lines 11-13 (track change version). The sentence on these lines provides, “In addition, to further address effects associated with facilities construction, operation, and maintenance within designated critical habitat, the PA includes implementation of restoration measures.” BOR and DWR should clarify to what “restoration measures” this sentence is referring, because it is unclear.

3. Other comments/edits to consider

Does there need to be a discussion of noise related to the use/operation of the tunnel-boring machine (i.e., noise that would travel through soils/land and affect aquatic species)?

Given recent final rule on critical habitat analysis, all reference to primary constituent elements (PCEs) should be replaced with physical and biological features (PBFs), pending confirmation with USFWS.

P. 3-4, Table 3.1-1. For “North Bay Aqueduct” line, is there any reference to Project's desire to relocate the NBA intakes to the Sacramento River near West Sac? This would be interrelated to the operations of the North Bay Aqueduct and water delivery.

P. 3-5, Table 3.1-1. For “Studies” row, NMFS IV.2.2, note that the six-year acoustic tag experiment study is not yet complete; there is still an experiment happening this year, and results and conclusions will need to be compiled, analyzed, and distributed.

P. 3-7, final paragraph. Suggest removing all instances of “allow” and revising language to indicate that this is the project's purpose, since that is how it reads. It may or may not allow the actions described in this paragraph.

P. 3-8. Correct “Jones PP” and refer to as “Tracy Pumping Plant (Tracy PP)” for consistency.

P. 3-12. Revise “Real-time changes to CVP and SWP operations that help avoid and minimize adverse effects on listed species must also consider public health, safety, and water supply reliability” to reflect that health and safety levels of exports are frequently considerably lower than the “desired” level of exports for all demands, so protection of listed species needs is often very compatible with meeting health and safety levels of water diversions. As the text currently reads, it would appear that listed species needs would conflict with human health and safety diversion levels on a frequent or regular basis.

P. 3-14, Table 3.1-2, “Smelt Working Group” line and p. 3-15. Add NMFS and the SWRCB as members of the SWG.

P. 3-16, Section 3.1.5.2.2.6 Delta Cross Channel Project Work Team. Note that this group met only during the drought period when TUCPs were being brought to the water board. Does not regularly meet.

P. 3-27. We recommend that the BA have more discussion of sweeping velocity. This is key in a tidal environment where the flows past the different screen locations can be bi-directional, with periods of zero sweeping velocity or at least greatly reduced on the flood tide.

P. 3-29. RBDD was never evaluated for effectiveness with regards to refugia or predator deterrence. The refugia component of the screens is still experimental and may not work as planned. Are there alternatives to this idea?

P. 3-52, Section 3.2.6.1. Note that Jones PP draws water from Old River/West Canal, not Middle River.

P. 3-55, Section 3.2.6.2.4. Note that the first bullet should read Old River/West Canal, not Middle River, since this is actually in the approach channel to Jones PP.

P. 3-58, Section 3.2.8.1. The HOR gate location approximately 300 feet west of the temporary rock barrier installation site may be too far back from the junction. This location in past studies has been shown to create a recirculating gyre that will increase predation risk. Likewise the bottom-hinged gates are expect to create fine scale turbulence which will enhance predation.

P. 3-103 – 3-104. Regarding “The louvers and screens allow water to pass through into the pumping plant but the openings between the slats are tight enough and angled against the flow of water such a way as to prevent most fish from passing between them and instead enter one of four bypass entrances along the louver arrays.” Note that this is not an accurate description. The louvers are actually behavioral barriers to passage for most of the protected species of concern. At 2 inches apart, the louvers allow a fish to swim between them if flows are low. Only fish with a body width greater than 2 inches are physically screened out by the louvers.

P. 3-108, Section 3.3.6. Many of the activities described (intake dewatering, sediment removal, debris removal, biofouling, treatment for corrosion) may require separate section 7 consultation at a time when more details become available. Citing a general observance of, and adherence to, in-water work window restrictions will not always be sufficient to determine the level of exposure and effect visited upon listed species, particularly upon those species that may be present year round (i.e. green sturgeon).