NMFS Progress Assessment and Remaining Issues Regarding the Administrative Draft BDCP Document[1]

4/4/13

In April 2012, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) submitted our "red flag" comments regarding the previous draft of the Bay Delta Conservation Plan (BDCP). These comments were developed by agency staff to flag those issues that may require significant changes to the BDCP and would need to be resolved prior to final submittal of the plan. Since then, NMFS has worked closely with the State and its consultants on the details of the revised BDCP. The following is an assessment of the materials provided to NMFS in the December 2012 Administrative Draft BDCP document as well as Section 5.5, which was submitted to NMFS in February 2013. Additional draft materials were subsequently submitted to NMFS on March 1st. We have conducted a cursory review of the March 1st materials to confirm that all of the following comments are still applicable, but we have not had the opportunity to conduct a complete and thorough review of those newer materials.

We would like to acknowledge the very significant improvements and progress that have been made in the development of the effects analysis and the plan itself over the past year. DWR has substantially amended the proposed plan by reducing the number of planned intakes and overall capacity and including significant improvements to operational criteria, including the High Outflow Scenario and improvements to South Delta Old and Middle River (OMR) limits. These changes are in direct response to our previous red flags and are critically important to providing for species needs.

We have experienced excellent cooperation and coordination with the project consultants (ICF International) along with the other planning agencies. There has been significant improvement in the expanded analytical methodologies used in the effects analysis and many technical and policy issues have been resolved. Many other technical and plan component issues are currently in active discussion, and we are optimistic they can be resolved with additional time, technical resources, and independent peer review. We look forward to continuing our close collaboration with all of the involved parties to resolve remaining issues and complete this planning process.

The first section of this document is intended to provide an assessment of the progress that has been made in addressing NMFS' initial comments provided in April 2012, following our review of the previous draft BDCP document. The format below shows our previous comments from last April, followed by our updated assessment of these issues in **bold print.** We have categorized the comment headers to allow for quick viewing:

- Critical = Significant disagreement between NMFS and consultant team and/or no significant progress made to resolve issue.
- Important = Significant progress has been made or is in process of being made on methods. We have not yet seen the results, or there is disagreement on results, or interpretation of results that NMFS believes could be resolved with more time and effort.
- Resolved = Red flag is resolved.

[1] December 2012/February 2013 version

The second section of this document describes several new comments and issues resulting from our review of the current draft of the BDCP (the December 2012/February 2013 version of the document or AdminDraft). These new concerns highlight key areas of the BDCP that will need to be addressed between now and the time that the plan and accompanying materials are submitted to us as a complete application under section 10 of the ESA. We have provided, where possible, suggestions for addressing these comments and are committed to working closely with our State and Federal partners to find resolutions to these issues. We view these comments as critical to the completion of a successful planning effort and generally they should be viewed as very important for resolution, preferably prior to issuance of the public draft. In addition to these comments, NMFS has also submitted more detailed technical comments and edits in "track changes" format for each chapter of the BDCP directly to the State and its consultants.

In summary, we note very substantial progress has been made, and we look forward to continue to work collaboratively with all parties towards timely completion of this ambitious plan.

Section 1: Progress Assessment on Resolution of Previous Comments/Issues: NMFS List of Issues Unresolved in BDCP Administrative Draft (from 4/2/2012; 2013 updates in bold print)

1.1 Hood Diversion Bypass Flows (Critical)

Previous comment: The Effects Analysis of the Preliminary Proposal (PP) raises concerns over reduced flows downstream of the North Delta diversions, especially in winter and spring months. These flows relate to:

A. Increased frequency of reversed Sacramento River flows at the Georgiana Slough junction. The January 2010 PP rules included a provision that north Delta pumping would not increase these reverse flows. CALSIM II results provided by CH2M-Hill indicate that the PP will increase the percent of time Sacramento River flows are reversed, causing increased entrainment of juvenile salmonids into the Central Delta. If the frequency of reverse flows increases due to the PP, then the diversion amounts allotted under the PP could not be implemented. The DSM2 analysis of reverse flows in the DPM suggests that tidal marsh restoration in the Delta will nearly offset both the effects of sea-level rise and large water diversions from the Sacramento River, a conclusion which needs much more explanation in the EA (see comment on tidal marsh effects).

B. Long-term viability of sturgeon populations. There are concerns that Sacramento River flow reductions will impact the reproductive success of white and green sturgeon, which have been documented to produce strong year classes mostly in years with high flows in April and May (AFRP study). We do not know if this has been addressed in revised Appendix C.

1. Further explanation and analysis of the reverse flow issue.

2. Work with the Services to find a diversion operating scheme that is still likely to be permitable after adequate modeling and analysis has been conducted.

Update: The modeling analysis in the Admin Draft indicates that the Evaluated Starting Operations (ESO) will generally result in a reduction in flows below the north Delta diversions, but that those reductions will not result in increased duration or magnitude of reverse flows at the Georgiana Slough junction. This conclusion is relatively counter-intuitive and the concepts and mechanisms that support this conclusion, and the level of uncertainty around it, need to be very clearly explained in thorough detail. We also recommend independent peer

review of these methods and results. Regardless of the modeling results, the planning parties agreed that the north Delta diversions would be operated in a manner that would not result in increased frequency, duration or magnitude of reverse flows at the Georgiana Slough junction. Therefore, the description of Conservation Measure 1 (CM1) needs to very clearly explain that real-time operations will be managed to insure that diversions in the north Delta will not result in increased frequency, duration or magnitude of reverse flows at the Georgiana Slough junction. Such a description is currently missing from CM1.

With regard to the Delta flows needed for sturgeon reproductive success, the spring outflows provided under the High Outflow Scenario (HOS) appear to meet the 25,000 cfs outflow in 50% of years as recommended in NMFS' Combined Scenario 5 (CS5) criteria. The other decision tree scenarios do not provide these flow parameters and therefore would not be likely to provide the necessary benefits to contribute to the recovery of green sturgeon.

There are additional concerns with the modeled ESO bypass flows with regard to juvenile salmonid survival downstream of the new intakes. The effects analysis acknowledges that there are potential impacts from reduced flows downstream of the intakes, as seen in the results of the Newman (2003) analysis, which shows slightly reduced (though not statistically significant) survival rates through the Delta, and the Delta Passage Model, which shows a slight decrease in smolt survival prior to the addition of survival benefits from Yolo Bypass.

NMFS has conducted a simple analysis of survival using Newman's (2003) and Perry's (2010) flow-survival relationships showing average survival rates under different bypass criteria levels (provided under separate cover). This assessment indicates a significant reduction in salmonid survival under level 3 pumping criteria for the ESO as compared to Existing Biological Conditions (EBC2). This is a key finding and should be carried through into the net effects analysis.

In summary, our recommendations on this topic are to:

- **Submit the reverse flow analysis and conclusions to independent peer review.**
- **Amend the HOS decision tree to include the green sturgeon criterion.**
- **Augment the effects analysis to include NMFS analysis and to highlight magnitude and certainty of effects associated with Level 3, as compared to Level 2 and Level 1 pumping/bypass criteria.**
- **Submit the NMFS and ICF analyses of survivals associated with varying pumping/bypass criteria to independent peer review.**
- **In light of steps above, seriously consider amending Level 3 pumping/bypass criteria prior to submitting the section 10 application.**

1.2 Salmonid Net Effects (Critical)

Previous comment: All salmonid species are grouped together, with no separate evaluations for the separate ESUs of Chinook salmon or for steelhead. It is important for the net effects analysis to describe individual ESUs/species, and provide full consideration of the life-history diversity and timing exhibited by each ESU/species. We also need the Sacramento River populations and San Joaquin populations for Spring-run Chinook, Fall-run Chinook, and Central Valley steelhead summarized by river basin, prior to the roll-up by ESU/DPS. Steelhead life-history and ecology especially warrant a separate evaluation. "Net effects" is useful for comparing alternative

operations, but will not provide the robust effects analysis needed for ESA purposes (see comment on ESA baseline).

Separate all Chinook by ESU, by San Joaquin and Sacramento populations, and separate steelhead in all analyses and discussion.

Update: The initial issue has been addressed. Each species and Evolutionarily Significant Unit (ESU) has a separate analysis.

Now that the analysis has been separated out by species and ESU, we have been able to determine the following concerns with the net effects analysis:

The net effects section does not provide a well-integrated assessment of the overall population-level effects of the plan. It is primarily a reporting of disparate segments and a summary of the different analyses, without an analytical method or over-arching conceptual model to tie them all together (i.e., feed one into another). It is still a discussion of the application of different methods to different life stages. Results are based on "environmental attributes" that are scored for magnitude of effect and uncertainty; the agencies did not have an opportunity to assess these scores and there are no tables of these attribute magnitude/certainty scores provided for salmon and sturgeon.

During the effects analysis review workshops conducted in November/December 2012, ICF and the interagency technical team agreed that the environmental attributes analysis in the net effects section should be fundamentally re-worked to make flow a much more robust element of the stressor tables by including the "five attributes" of flow (magnitude, timing, frequency, duration, and rate of change), how the project would affect each of these attributes, and how these changes would affect fish. These agreements are not reflected in the framework of the current environmental attributes analysis and should be incorporated into the next draft.

There needs to be a systematic method for selecting the number of attributes that are summed in the net effects. For example, for steelhead, there are four categories of food in the summary figure, which doesn't seem appropriate for salmonids, especially the migrants. At the same time, no benefit is assigned to channel margin habitat restoration in the figure. A table showing the summed scores for all attributes would be more helpful than the figure.

The attributes themselves need to be better defined. E.g., how does "Sacramento River Flows" differ from "Sacramento River Habitat" differ from "channel margin" or "riparian"? A conceptual model would help with this. The assessment should be of the *change* in these factors attributable to the project.

There needs to be a second level of analysis to weight the results by the proportion of each life history type exposed to the effect (e.g., the 95% migrants to 5% foragers split for juvenile steelhead seems appropriate, but each segment is given equal emphasis in the summary figure).

Some QA/QC needs to be done to make sure the conclusions from the text match the summary figure (e.g., in steelhead, the figure shows a moderate benefit from Feather River flows, but there is no discussion of this in the text).

The changes in flows mentioned for some locations need to be translated to their effects on water temperature in order to fully understand their impact. For example, a 28% reduction in flow for the American River shown under ESO and HOS in the summer and fall months could potentially cause significant temperature issues for juvenile steelhead, as these are the months that the river can get very warm in lower-flow years.

There also needs to be a more systematic method for assigning level of benefit from a CM to a species. For example, in the steelhead net effects section, the sensitivity analysis for non-physical barriers showed a 0.00 (zero) survival increase in one year, and a 0.03 increase in a second year, yet the conclusion was a moderate positive change with moderate certainty. We recommend that a facilitated workgroup including biologists from all five agencies and ICF be charged with assigning specific magnitude and certainty scores and documenting the rationale and data sources for those determinations.

As part of the South Delta Research Collaborative, NOAA's Southwest Fisheries Science Center has developed a simple "top-down" conceptual model of south Delta operational effects on salmonids, which among other things links hydrodynamics to predation. We recommend that ICF coordinate with the agency staff involved in this collaborative process and exchange information on common issues being analyzed in both efforts.

In summary, our recommendations on this topic are to:

- **Conduct a facilitated workshop with the agencies to identify conceptual models of operational effects on salmonids and sturgeon and to agree on a model to guide the quantitative net effects analysis.**
- **Conduct a facilitated workshop with agencies to discuss and define environmental attributes and scores, the methodology of combining and weighting scores, and incorporation of the five attributes of flow.**
- **Complete a thorough cross-check of conclusions in text against those in figures.**
- **Explore flow-temperature relationships in upstream areas to provide a better inference of effects of reduced flow on temperature stress.**

1.3 ESA Baseline, Future Conditions, and Climate Change (Important)

Previous comment: In order to conduct the ESA jeopardy analysis on the PP, the baseline condition and projections of future baseline conditions, including effects of climate change, need to be re-written to be consistent with the 2009 Biological Opinion and current case law. ESA regulations define the environmental baseline as "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." Implicit in this definition is a need to anticipate the future baseline, which includes future changes due to natural processes and climate change. For the ESA jeopardy analysis we add the effects of the proposed action[2] to the

[2] Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.

environmental baseline to determine if there will be an appreciable reduction in the likelihood of survival and recovery of the species (by reducing its reproduction, numbers or distribution).

Upstream effects associated with climate change need to be in the baseline and future conditions, with any effects of the project (in the Delta or associated with upstream operations) added to that future condition to determine jeopardy. A project proposed in this type of baseline conditions needs to more than offset its effects in order to alleviate a jeopardy finding.

Update: As a result of this comment, ICF is developing a scope to conduct a new "aggregate" analysis that meets the needs of FWS and NMFS. NMFS intends to continue to work with them and the other agencies to complete this analysis and incorporate it into the effects analysis of the proposed project prior to submitting the section 10 application.

1.4 Analysis of Water Temperature Impacts (Important)

Previous comment: Lethal and sub-lethal water temperature thresholds need to be examined at a finer scale. Currently the effects analysis relies heavily on a Reclamation water temperature model which can only estimate monthly values, which have limited value for predicting project effects on fish. In addition, the effects analysis has only presented frequencies of temperature threshold exceedances, while the magnitude and duration of exceedance is also very important. We do not know if this has been addressed in revised Appendix C.

1. Provide tables and probability plots of magnitude and duration of temperature exceedances at certain upstream locations, by water year type and month.
2. Technical discussion with Reclamation and CH2MHill about how to post-process data.
3. Investigate the use of SWFSC's Sacramento River temperature model to predict project effects and make hindcasts of empirical temperatures.
4. Investigate the use of the new American River temperature (and storage and flow?) model

Update: NMFS and ICF are working to develop temperature data presentation methods that provide a more useful representation of results. Daily data will be used when available to indicate the magnitude and duration of temperature exceedances at compliance locations. These new analytical methodologies have not yet been incorporated into the effects analysis.

1.5 Assumption of Habitat Restoration CM Success (Critical)

Previous comment: In several places, the EA assumes that adverse impacts of the PP will be offset by unsubstantiated benefits of habitat restoration. The EA assumes that all restoration will be successful and work as predicted, with little or no evidence to support this prediction and no attempt to analyze the potential outcomes of less than perfect success.

1. It is imperative to avoid language such as "This conservation measure will...", because the anticipated CM outcomes are based on conceptual thinking, not execution. To be able to comprehensively think through the adaptive management and monitoring plan, implementers need to try to anticipate a range of responses that must be managed in order to be prepared for the uncertainty of the response.
2. Alternative outcome scenarios should be evaluated to bracket the range of possible outcomes from proposed habitat restoration.

Update: Language has been altered to reflect uncertainty to an extent, but alternative outcome scenarios have not been evaluated; all analyses and results assume that restoration activities will be successful. Alternative outcome scenarios showing varied effectiveness of habitat restoration efforts have not been provided, and therefore it is not possible to assess the effects of CM1 without the assumed benefits of completely successful habitat restoration. The total success of habitat restoration efforts remains highly uncertain, and an appropriate analysis should include an evaluation of the biological effects of at least a partial failure of efforts that are expected to "improve" conditions.

ICF has indicated that a comprehensive list of previously restored areas and "lessons learned" is included in the description of CM3, but we were not able to find the summary of "lessons learned". The list in Table 3.4.3-5 shows several estuarine aquatic habitat restoration projects but the "Results" column does not provide any direct links to improved biological metrics such as growth, survival, or abundance of native fishes.

1.6 Overreliance on Real-time Operations and Adaptive Management (Important)

Previous comment: In several places, the EA assumes that adverse impacts of the PP will be fully resolved through the implementation of real-time operations and adaptive management. This may not always be possible. For example, long-term trends towards reduced carryover storage may not be able to be mitigated using real-time operations. How adaptive management might work in this situation has not been fully assessed. There are going to be limitations on what adaptive management and real time operations can accomplish.

> *Examine recent (five to ten years) real-time management of the cold water pool in Shasta Reservoir to determine both the effectiveness of real-time operations and a range of adaptive management options.*

Update: The majority of upstream issues have been addressed through major changes in the proposed project (not withstanding some remaining issues with egg mortality and juvenile survival discussed below). However, there remains a need to more clearly describe how real-time operational adjustments will be implemented to achieve some of the stated objectives of the water operations. Specific examples include the need to thoroughly describe how the new intakes will be operated to: 1) avoid reverse flows at Georgiana Slough; 2) implement pulse protection when monitoring indicates that winter-run Chinook are "riding" a flow pulse; and 3) determine when a sufficient percentage of winter-run Chinook have passed the intakes to end the pulse protection and initiate standard level 1 pumping procedures. While it is understandable that these real-time criteria have not been developed to date (because they have not been necessary to complete CALSIM modeling and run monthly average models of effects), we will need greater specificity on real-time operations in order to meet section 10 permit issuance criteria and complete the underlying Section 7 analysis. We recommend that an interagency technical team be formed immediately to work with ICF to start scoping these real-time criteria.

1.7 North Delta Diversion Effects (Resolved)

Previous comment: Mortality rates from predation and other screening effects are difficult to predict, as there is a high level of uncertainty associated with predation and other effects on

juvenile salmonids. The estimate of <1% loss at all 5 screens is not sufficient without giving additional consideration to higher estimates of mortality (GCID empirical studies showed a 5% per screen loss rate, much higher than the <1% used in the DPM).

1. Bracket the analysis of screen related mortality around a 5% per screen loss assumption.

2. Investigate the use of DWR's hydrodynamic model to assess local flow alterations at the proposed diversion structures, including the creation of predator holding areas. Specific questions are whether the model can simulate on-bank structures and the additional hydrodynamic effects of active pumping.

Update: This comment has been addressed through the inclusion of a more comprehensive analysis of potential screen related mortality including an assessment of a 5% per screen loss rate. The recommendation to conduct a detailed hydrodynamic analysis of the screen face area is being advanced by the Fish Facilities Studies Group. This analysis should be incorporated into the effects analysis when it is available.

1.8 Predator Control Conservation Measure (Important)

Previous comment: We agree that predation is a significant risk factor to the listed species, but the assumed positive results of this CM are questionable and unsupported (see F.5.4.1.4 in Appendix F). As an example, localized control of striped bass may not be feasible as this species exists throughout the Plan area and are highly mobile. Few specific details have been presented on how the CM will be implemented, and an aggressive predator removal program could result in significant incidental take of listed species. Due to the high level of uncertainty, we find it very unlikely that we could rely on this measure for any benefits during the permit process.

Remove this CM measure from the plan, and move it to an experimental research program and link to adaptive management. Reflect this appropriately in the EA.

Update: The authors have generally toned down the level and certainty of beneficial effects anticipated from CM15 (Predator Control). However, the measure still lacks an appropriate metric to measure the success (or lack thereof) of the predator control program and seems to assume phase 1 (the scoping stage) will show success and phase 2 will be implemented. There is no discussion of what happens if phase 1 shows no benefits from the program. The conservation measure needs to clearly explain how the success of this action will be measured (metrics and success criteria). The analysis of CM15 also needs to take the next step and describe the expected outcomes if the measure is less than fully successful. This is a very important element of any analysis of actions whose outcome is highly uncertain and should be considered a universal recommendation for all measures where the results of implementation have high uncertainty.

1.9 Delta Passage Model (Important)

Previous comment: The Delta Passage Model (DPM) is used as the sole predictor of smolt survival in baseline and PP scenarios. However, the assumptions, inputs, and results are still being validated and reviewed. The datasets used in this model are very limited and largely based on results from hatchery late-fall run Chinook, which are then being applied to other runs of Chinook.

Continue refinement and development of DPM. Weigh validity of results against those of other models and relationships. The use of Newman, 2003 may be another tool to use for assessing the survival of fall and spring run smolts through the Delta.

Update: DPM continues to be refined through discussions with Cramer Fish Sciences and NMFS. Survival analyses based on methods in Newman (2003) have been incorporated into the effects analysis, and results of both models showing similar trends for the modeled years are discussed in the net effects section. NMFS recommends that this model continue to be used as an informative tool but that the results be closely scrutinized to determine what is driving them and if they make sense based on the system as we know it. NMFS also recommends that additional peer review should be conducted – perhaps a reconvening of those who participated in the previous workshop in June 2011.

1.10 Deficient Analysis of Fry Passage/Survival (Important)

Previous comment: Because the DPM model is only for smolt sized fish, the salmonid analysis is insufficient as it provides no information on fry-sized salmonid passage/survival**.**

Add qualitative analysis of fry survival based on best available data. Perhaps add time/added mortality to a modified version of an updated DPM model.

Update: In this new draft, fry growth is analyzed relative to the Yolo Bypass and a fry Particle Tracking Model (PTM) analysis was included (See 5C.5.3.7; 5C.5.4.1.4). ICF has acknowledged these analyses need additional agency input for the public draft. The PTM analysis was discussed at recent species-specific meetings where it was determined that it may not be appropriate for this application. NMFS has requested (and ICF is working on) more detailed (3- and 7-day) PTM output to allow a closer look at travel time through key reaches, which may potentially be linked to fry survival rates through those reaches. It is generally agreed that neutral particle movement does not necessarily mimic the movement of living fish and the SWFSC/NMFS life cycle model will include a "smart PTM" component that attempts to add more "life-like" movement to the particles, which may provide a better way to analyze fry survival.

1.11 PTM Runs Inadequately Capture Altered North Delta Hydrodynamics (Important)

Previous comment: PTM model runs did not include conditions in which ND diversions would be at the upper limits of allowable pumping (high proportion of total river flow). The technical memo from NMFS and USFWS highlighted the issue and the resolution to the problem. We will need additional modeling runs to adequately assess ND diversion impacts on salmonid travel time and route entrainment.

Do additional PTM analysis following guidelines outlined in NMFS/USFWS memo.

Update: While it appears from Chapter 5 Appendix B.6 and Appendix C.4.3.2.4 that some of the suggested time periods were included, Attachment 5C.A.9 indicates that PTM was run for 24 representative months. These are the same months that were used in the previous (February 2012) effects analysis draft. The methods attachment needs to be updated to reflect the additional runs.

The time periods recommended by NMFS and USFWS were selected based on evaluation of impacts of a 15,000 cfs capacity project. It is possible that different time periods would be more appropriate to assess the effects of a 9,000 cfs capacity diversion. NMFS will continue to look into this and determine whether the modeled periods capture an appropriate range of effects from the updated project.

1.12 D1641 Export/Inflow Ratio (Important)

Previous comment: Combined north and south Delta exports under the PP exceed the current D-1641 Delta Export/Inflow standard. (The PP calculation method measures Sac River inflow below the North Delta diversions and does not include ND diversions as part of total exports).

1) *Provide summary analysis of differences between PP and EBC by month and water year type using alternate E/I calculations.*
2) *Show resulting flow data for both calculation methods.*

Update: The Export/Inflow (E/I) ratio has been applied two different ways in the three project scenarios (ESO, HOS, and LOS). The "Partial E/I", which measures Sacramento River inflow below the north Delta diversions and excludes north Delta diversions as part of total exports, has been applied to ESO and LOS. However, HOS has been modeled using the "Full E/I", which includes the full Sacramento River inflow upstream of the diversions as inflow and the north Delta diversion exports as exports. This is an inconsistency in approach that raises questions about the subsequent analyses. ICF has indicated that new analyses have been done but have not yet been fully incorporated into the effects analysis. There is placeholder language in CM1 showing both options but the actual operational criteria to be implemented upon project completion has yet to be decided. NMFS recommends that the "Full E/I" criteria be adopted and that this methodology be applied across all scenarios for consistency.

1.13 Yolo Bypass (Important)

Previous comment: Yolo Bypass has great potential for fisheries benefits, but the current EA may be overstating the benefits without adequate studies or data to support these conclusions. Without project specific plans to help quantify the effects, concerns remain about issues such as sturgeon passage, juvenile salmonid survival under lower flow regimes, ability to get juveniles into the floodplain through notch and reduction of flows in the mainstem Sacramento River to accommodate additional flooding in Yolo Bypass. Also, some races/runs of salmon may not have access to Yolo Bypass.

Provide project specific plans and consider the risks of managing the floodplain under lower flows related to issues above.

Update: ICF has indicated that these project specific plans are not yet available, but risks related to stranding, passage, etc., are acknowledged. See 5.C.5.4.1. This is another conservation measure where a lack of specific designs and operating criteria create significant uncertainty as to the efficacy of the measure and level of biological benefits that it will provide. However, the net effects analysis attributes broad success and significant benefits from the measure with no analysis of the consequences of less-than-complete success. We suggest that this is another area where an analysis of less than fully successful implementation should be conducted to determine the sensitivity of the overall plan to the success of this CM.

1.14 Channel Margin Habitat (Important)

Previous comment: Altered flows resulting from the North Delta diversions may result in reduced water levels affecting the percentage of time that current wetland and riparian benches are inundated.

Compare anticipated water levels under future scenarios with those in the design documents of restored wetlands and riparian benches to analyze potential dewatering of those features.

Update: NMFS and ICF are coordinating to develop and execute an effective analysis of the effects of proposed operations on inundation of existing wetland and riparian benches. We will need to assess the results of this analysis with respect to effects on covered fish once the analysis is completed. This analysis should also be submitted to independent peer review.

1.15 Construction and Maintenance Impacts (Important)

Previous comment: The EA does not adequately address the potential for adverse impacts on sturgeon, fall-run Chinook adults, and steelhead adults, which are generally present in the project area during the proposed in-river work windows described for construction and maintenance of North Delta facilities.

Discuss ways of minimizing impacts and implementing mitigation for species not protected by work windows.

Update: NMFS has been working with ICF to incorporate more detail into the construction and maintenance impacts analysis. This has resulted in significant improvements in the analysis. However, several elements, particularly regarding the long-term maintenance of the facilities, lack the detail and specificity to allow NMFS to conduct a thorough assessment of the amount and extent of take that will need to be included in the permit and the section 7 consultation analysis for the project. NMFS generally requires in-water construction projects to be at the 80% design stage for section 7 consultations, and we will likely need that level of design completion to conduct a thorough assessment of the amount and extent of take for this large construction project. We request information from ICF on when this level of design will be ready in order to understand the implications for the schedule, if any.

1.16 Tidal Marsh Impacts on Riverine Flow (Important)

Previous comment: The effect analysis assumes that restored tidal marsh will act to decrease flow reversals, which has not been well explained. It seems that tidal marsh restoration was modeled as a single configuration; there has been no description of that configuration to indicate how they were implemented in the hydrodynamic models. Therefore, there is a lot of uncertainty regarding model results.

Document changes to hydrodynamic models that were implemented to characterize tidal marsh restoration.

Update: ICF has communicated to NMFS that the data that can be provided is limited, and that ICF and the California Department of Water Resources (DWR) have provided as much specificity as they can. ICF met with NMFS and other agencies on March 5, 2013, to provide

additional information regarding the relationship between restoration and tidal dampening as they relate to riverine hydrodynamics, and more specifically to reverse flows near Georgiana Slough (See 5.C). We suggest that the document include a more comprehensive narrative of the tidal hydrodynamics and the effects of tidal habitat restoration, including a discussion of the RMA modeling conducted on this topic. Because of the importance of this analysis to determining potential project effects on covered fish, we recommend that these methods be independently peer reviewed and appropriately characterized for their uncertainty.

1.17 Cumulative Effects Show Long-Term Viability Concerns for Salmon (Critical)

Previous comment: The analysis indicates that the cumulative effects of climate change along with the impacts of the PP may result in the extirpation of mainstem Sacramento River populations of winter-run and spring-run Chinook salmon over the term of the permit.

1) Incorporate operational criteria into the PP that will protect and conserve suitable habitat conditions in the upper river for the species under the 50 year HCP (these operational criteria should be designed to meet the performance criteria in the NMFS BiOp RPA).

2) Convene a 5-agency team of experts specialized in Shasta operations and temperature management to develop the above described operational criteria.

Update: The current efforts to develop a fully "aggregated" effects analysis should address the analytical concerns related to this issue, but the fact that the cumulative effects of the project when combined with effects of climate change and other baseline conditions is showing the potential extirpation of mainstem Sacramento River populations of winter-run and spring-run Chinook salmon over the term of the permit remains as a serious concern.

The reported OBAN and IOS modeling results indicate a potential issue with either the modeling tools (OBAN and IOS), or the author's assertion that the upstream flows associated with EBC2 and ESO are "essentially identical". The conclusions in this section state that "The majority of the effects of both BDCP and climate change were driven by increases in upstream temperatures affecting egg survival, which, relative to the BDCP contribution, is a potential modeling artifact and not an actual predicted effect." However, ICF has determined that these are the best modeling tools available. The results cannot necessarily be discounted because they do not show what was "expected". Since these methods were deemed acceptable, the results need to be fully acknowledged.

The results of these models signal a need for further investigation to determine why they are not what are "expected". It seems that upstream releases between ESO and EBC2 do not match as well as thought, as seen in Table C.5.2 2 titled "Difference and Percent Difference in Flows in the Sacramento River at Keswick, Year-Round". Some summertime and fall months in drier years are very different, which may be what is causing the biological models to show a negative egg survival response. The table below shows the results of month-to-month comparisons of flows out of Keswick for LLT. It indicates that the ESO flows could be as much as 6500 cfs less than EBC2 flows (November) when months are evaluated individually, and not grouped by month and water year type.

Month	Maximum Difference (ESO_LLT - EBC2_LLT)
January	-7683
February	-1571
March	-4825
April	-1221
May	-830
June	-2979
July	-5916
August	-3712
September	-2691
October	-5510
November	-6504
December	-4594

We recommend that ICF work with the Shasta operations experts at Reclamation, and possibly a broader workgroup of biological and operations experts to resolve these issues and determine if/how the entire project can be operated to insure that BDCP does not cause impacts to upstream spawning and rearing habitat in the Sacramento River.

1.18 Holistic Estuarine Evaluation (Critical)

Previous comment: The effects analysis should examine synergistic and cumulative ecological impacts associated with reducing inflows to an estuary that is already severely degraded, and discuss the importance that water quantity, quality, and the natural hydrograph have to the ecosystem, as well as the direct impacts on native fish species. So far, the impacts to fish have mostly been examined in a piecemeal fashion (e.g., examining impacts of flow reduction on adult homing).

> *Incorporate a holistic evaluation of impacts on the estuarine ecosystem. Include discussion of the importance of water quantity, quality, and the natural hydrograph to the ecosystem, and the direct impact that changes to these conditions have on native fish species.*

Update: The holistic evaluation described above in our previous recommendation does not appear in the 2013 Admin Draft of BDCP. We suggest that ICF use Carlise et al. (2010) as a starting point for this discussion. Carlisle et al. found that in an analysis of over 200 stream systems, "biological assessments showed that, relative to eight chemical and physical covariates, diminished flow magnitudes were the primary predictors of biological integrity for fish and macroinvertebrate communities". In other words, the change in flow was a better predictor of whether the biotic communities were impaired than variables such as temperature, pH, total nitrogen, or urban land cover. It is also well recognized that streamflow reductions can impair the ecological function of downstream estuaries (Drinkwater and Frank 1994; Jassby et al. 1995; Loneragen 1999; Flannery et al. 2002; Winder et al. 2011).

1.19 Burden of Proof (Important)

Previous comment: Deference should be given to known population drivers and documented relationships (e.g., sturgeon recruitment relationship with flows is well documented, though the exact mechanism is not completely understood). Since flow is a key component of habitat for aquatic species, do not assume that it can be substituted for by other actions.

Do not assume that incremental benefits in a conservation measure will compensate for known population drivers related to flow.

Update: There has been significant improvement in the language used to describe the level of certainty of potential benefits attributed to those CMs that are less certain in their implementability or effectiveness for protecting covered fish. However there remain some instances of overstating/understating of beneficial/detrimental effects. For instance, the net effects analysis concludes that CM2 will "increase floodplain availability and usage and improve conditions for juvenile and adult winter-run Chinook salmon". However, the analytical methods for juveniles suggest only a low or moderate positive change. There are some stated conclusions that are based on analyses that are not yet complete (e.g., bench inundation). Some conclusions suggest that decreases in flows due to the project are "rare" because they only occur in some months of drier water years. But since dry and below normal water years can occur 40% of the time, this should not be considered a "rare" occurrence. There are numerous additional examples of these types of analytical discrepancies provided in the "track-changes" comments on the Admin Draft provided by NMFS.

1.20 Incomplete Analyses and Documentation (Important)

Previous comment: The full appendices were not released concurrently with Chapter 5 which makes review of the results problematic.

Provide all appendices/analysis simultaneously so Services can have all pertinent information used in Effects Analysis summaries without having to backtrack weeks later.

Update: While NMFS received the majority of the document on 12/21/12, this did not include Chapter 5.5 Effects on Covered Fish. Appendix 5.B Entrainment was provided on 1/2/13. Chapter 5.5 Effects on Covered Fish was provided on 2/7/13. This lag reduced the ability to simultaneously view results in appendices and assess how they were incorporated into Chapter 5.5.

The "complete" Admin Draft was delivered on March 4, 2013. This presumably includes all additional outstanding sections (Section 5.3 Ecosystem and Landscape Effects, Table 5.2-5 Biological Objectives for Covered Fish and Their Assessment in the Effects Analysis, Tables C.0-3 and C.0-4 Summary Tables, Appendix 5.I Critical Habitat and Essential Fish Habitat Analyses). NMFS has not had an opportunity to conduct a thorough review of this recent submittal.

Specific documentation for all analytical methods are not included or are outdated or incorrect (e.g., SacEFT documentation is outdated according to its developers; OBAN, MIKE21, SALMOD, Reclamation Mortality Model documentation is not included at all). This makes it impossible to fully understand how these models were configured or to determine the exact drivers of the reported results. It appears at times that the chapters/appendices were written by staff unfamiliar with the model operations and intricacies of results.

NMFS suggest that future drafts include updated and correct documentation (manuscripts, user's manuals, etc.) for all analytical methods. Documentation should include listings of all relevant input parameters and relationships. ICF should also draw on the expertise of the developers of specific models to interpret model results, identify uncertainties and limitations, and verify the stated conclusions.

1.21 Insufficient Biological Goals and Objectives (Important)

Previous comment: The conservation measures are sometimes defining the BDCP species objectives, which is insufficient. 30% juvenile through-Delta survival is not a suitable goal for a 50 year conservation plan.

The BDCP objectives should be biological, species-level outcomes.

Update: This issue has generally been resolved (for salmonid BGOs) through the incorporation of the recommendations provided in NMFS' technical memo on juvenile salmonid through-delta survival. However, the text that describes the BDCP's level of responsibility for achieving the through-delta survival objectives does not match what is described in the NMFS tech memo on salmonid BGOs. The tech memo calls for the BDCP to be responsible for 100% of the improvement in smolt survival through the Delta, not >50%. This is because it will be impossible to determine causation for any measured increase in through-delta survival rate. The specific objectives are interim and should be reevaluated over time. The actual tech memo should be included as an appendix to Chapter 3.

The biological objectives for sturgeon abundance and productivity (under GRST1) are vague and rely too much on "documenting the current distribution" and future studies. There needs to be greater emphasis on the objective to provide adequate adult attraction flows.

1.22 OMR Flows Unimproved in Drier Water Years (Important)

Previous comment: Improved OMR flows under the PP occur during wetter years when OMR is less of an issue for covered fish. PP OMR flows are often worse than, or similar to, EBC in drier years. Sacramento Basin fish are most vulnerable to entrainment into the central Delta in drier years when Sacramento River flows have the potential to reverse and OMR levels are below -2,500 cfs. San Joaquin basin fish are best protected by increased Vernalis flows and/or a HORB which the PP does not address.

1. Analyze the risk in different water year types and with different flow levels in the Sacramento River.

2. Implement Scenario-6 to help address the adverse impacts seen under the PP.

Update: This issue has generally been addressed by adopting "Scenario 6" into the proposed project and including the High Outflow Scenario into the decision tree. There were additional south Delta operational criteria included in the agency recommendations developed in the CS5 process. These included additional protections in the "shoulder" months of the juvenile salmonid migratory period (March and June), as well as summer OMR criteria intended to provide protections against sturgeon entrainment into the export facilities. The potential biological benefits of these CS5 criteria should be assessed in the effects analysis. ICF's participation in the South Delta Research Collaborative will provide an important linkage between BDCP and the conceptual models and hypotheses emerging from that effort. This

remains a key issue because of the importance of improving survival of emigrating salmonids from the San Joaquin River system, which is generally less than 10%. We recommend continued iterations on these operations prior to Plan completion, and between Plan completion and full implementation (during ELT).

1.23 Non-Physical Barriers (Important)

Previous comment: Assessment of non-physical barriers is inadequate, and the potential negative effects of predation associated with non-physical barriers haven't been assessed.

Include analysis of potential adverse effects of non-physical barriers.

Update: This is another instance where the certainty of beneficial effects from a CM is overstated in relation to the amount and quality of data on which those conclusions are based. The Georgiana Slough non-physical barrier (NPB) effectiveness is based on one year of data from high flow conditions. We have yet to see results from a lower-flow year when reverse flows at the Georgiana Slough junction may be more frequent. It should also be acknowledged that under the OCAP Reasonable and Prudent Alternatives (RPA) the development and implementation of NPBs would be required if they are found to be effective.

Also, the way in which the effects of NPBs are described is confusing and potentially misleading. According to Appendix 5C.5.4 Methods, there was a 67% reduction in the proportion of fish entering GS/DCC (from 22.1% to 7.4%). However, in the text it is often stated that the NPB provides a "67% deterrence", which implies that 67% of fish approaching the junction would be deterred, and therefore stay in the mainstem. That is not true. It would be better to describe this as a "67% decrease in proportional entry into GS."

1.23.1 Carry-over of OCAP RPA's on technological improvements to South Delta Facilities (Critical)

Previous comment: By not carrying forward technological fixes in the South Delta called for in the OCAP RPAs into the Conservation Measures, we would expect the effects analysis to specifically flag this and analyze it as a degradation to future conditions (as compared to the baseline which should include the RPA improvements).

Add south Delta technological improvement RPA's to Conservation Measures

Update: ICF states that "Many RPAs are assumed to be completed prior to the implementation of BDCP and/or CM1 and are therefore assumed in the baseline (This is clarified in Tables 3.2-1 and 5.2-2.)". However, all the comparisons in the effects analysis are to current levels of pre-screen loss and salvage, not to what they might be with these RPA elements implemented. Therefore, the results overstate the benefits of the project as compared to an appropriate baseline condition which should include these RPA required improvements.

This same issue is repeated by the fact that the analytical baseline (EBC) does not include potential beneficial effects of Yolo Bypass floodplain habitat restoration, and implementation of non-physical barriers, both of which are included in the OCAP RPA. This is a significant flaw in the net effects analysis. The analysis needs a clearly stated caveat of interpretation of results to reflect this limitation. The aggregate analysis should be helpful in addressing these beneficial effects in a different framework.

1.24 Feasibility of 65K acres of Habitat Restoration (Critical)

Previous comment: Recent evaluation of land available for habitat restoration indicates potential roadblocks to acquiring all the land proposed in the PP. DWR's own analysis suggests that 65K acres is very unlikely.

Analyze the potential effects of partial implementation of habitat restoration and incorporate alternative actions or measures to compensate for this possibility.

Update: The previous comment from 2012 was referring specifically to tidal wetland habitat. Since that time DWR has revised their habitat restoration feasibility analysis and expanded the definition of the "tidal natural communities" category to include all tidally influenced habitats to be restored under BDCP. DWR believes that it will be possible to fully achieve the plan's habitat restoration goals. However, there is no specific analysis of the feasibility of acquiring 65,000 acres of land appropriate for tidally influenced habitat restoration provided in the document. All related analyses proceed as if restoration will be wholly successful; there are no bounding analyses to show the effects of CM1 operations if restoration either cannot be completed to the full extent or is not fully successful. Therefore, our previous recommendation stands: Analyze the potential effects of partial implementation of habitat restoration and incorporate alternative actions or measures to compensate for this possibility.

Section 2: Additional Issues to be Resolved for Public Draft

Chapter 1

Introduction - Track changes comments submitted separately.

Chapter 2

Existing Ecological Conditions - Track changes comments submitted separately.

Chapter 3

2.1 <u>Decision Tree process needs to include consideration of flow needs for salmonids and sturgeon (Section 3.4)</u>

Modeling results of the HOS indicate that flow requirements intended to address the needs of smelt would also be likely to address some of the flow requirements for salmonids and sturgeon identified through the CS5 process. However, the description of the Decision Tree management process states that monitoring and research used to determine which "tree branch" would be implemented would only look at smelt issues and would not attempt to determine which flow scenario would be appropriate for salmonids and sturgeon. The monitoring and research should also investigate the flow needs of salmonids and sturgeon and the determination of which flow scenario will be implemented should be based on the needs of all covered species. There also needs to be a clear understanding that while the current Decision Tree would create four possible combinations of spring and fall outflow criteria that would be included in the range of potential options for initial study, prior to commencement of conveyance operations, there will be a new determination by the permitting agencies specifying what

the spring and fall outflow criteria will be at the time the new facility begins to operate. This determination will be based on all best available science, including that developed during the decision tree process.

2.2 Sensitivity analysis of likely effects of future increase in south-of-delta storage capabilities (Section 3.4)

There is a high likelihood that south-of-delta storage capabilities will be increased over the 50-year term of this permit. There is also the potential for such an increase in storage capacity to result in water operation parameters (pumping rates/timing, OMR flows, I/E ratios, etc.) that differ from those modeled in the current analysis. There needs to be a "sensitivity analysis" of the likely effects of future increase in south-of-delta storage capabilities on these operational parameters and the resulting biological effects on covered species.

2.3 No description of "operational phasing" of north Delta facilities (Section 3.4 and 3.6)

The document lacks any language describing the agreement to use "operational phasing" in lieu of construction phasing, as agreed to by the BDCP principals. The plan will need to include significant detail on the monitoring and metrics necessary to implement the operational phasing agreement and a detailed description of how all aspects of that agreement will be implemented. We have provided the document describing the details of the Principals' agreement last spring, and these need to be accurately reflected in the conservation measures and as a separate section of the adaptive management chapter.

2.4 The Role of Adaptive Management (Section 3.6)

Almost three years ago, the Federal Agencies issued a white paper on application of the Five Point Policy to the BDCP (document attached to this memorandum). It articulated the role of adaptive management in the BDCP, saying, in part, that

> "The BDCP is a complex, landscape scale, long-term HCP with a high degree of uncertainty as to how close the initial conservation measures will come to achieving the plan's biological goals and objectives. It falls into the category of plans that will be a mixture of the two strategies, with initial prescriptions associated with adaptive management, and specific biological outcomes defining the ultimate success of the plan. This type of plan will allow management flexibility so the permittee may institute actions necessary to achieve the plan's goals while providing boundaries for future expectations and commitments. In addition, a results-based plan will address uncertainty in the ecosystem and provide the conservation assurances required by the Act. The Services will be challenged to make the findings required for permit issuance if the plan does not include clearly defined and scientifically supported biological goals and objectives, an adaptive management plan that tests alternative strategies for meeting those biological goals and objectives, and a framework for adjusting future conservation actions, if necessary, based on what is learned." (4/29/2010 memo, page 1)

The adaptive management program created by the BDCP serves the essential functions of (1) assuring that alternative conservation measure designs that might more efficiently achieve objectives are studied and, where appropriate, implemented; (2) providing a workable framework for deliberating difficult management issues and proposing solutions; and (3) providing transparency in the management of the BDCP to ensure public confidence that the conservation measures and strategies implemented under

the plan are based on the best available science. We have concerns with the current draft on all three of these points.

2.5 Adaptive Limits (Section 3.6)

"Adaptive limits" in the BDCP refers to the most extreme sets of operational parameters that might be required or authorized to the permittee through the working of adaptive management over the life of the permit. Some discussion of what such parameter-by-parameter limits might be has already occurred, but neither the concept of adaptive limits nor a draft example of them is included in the current BDCP draft. This leaves open the question of what commitment of resources might be required of the permittee.

As is clear in both the HCP Handbook and the Five Point Policy, the permittee in an HCP is protected by the inclusion of adaptive limits that "clearly state the range of possible operating conservation program adjustments due to significant new information, risk or uncertainty. This range defines the limits of what recourse commitments may be required of the permittee. This process will enable the applicant to assess the potential economic impacts of adjustments before agreeing to the HCP." 65 Fed. Reg. 35253; see also HCP Planning Handbook at 3-24 – 3-25.

In the BDCP, adaptive limits would provide an important assurance that would protect the permittee from an open-ended obligation to commit resources irrespective of circumstances. They would also provide an important level of transparency to the permittee and the public regarding the commitments represented in the plan. The range of adaptations to reflect evolving scientific understanding and improved information on the effectiveness of the various conservation measures are usually described as changed circumstances within an HCP that has high scientific uncertainty, such as this one, and therefore do not trigger a formal plan amendment. Thus, the adaptive limits serve as an important guide regarding the boundaries of the anticipated changed circumstances.

2.6 Role of BGOs (Section 3.3)

Biological Goals and Objectives form the core of the BDCP. Biological goals represent the ultimate conservation outcomes toward which the plan is striving. In some cases, achievement of ultimate goals lies within the power of the BDCP; in others the achievement of goals depends in part on factors that are outside the control of the water projects. Objectives are lower-level outcomes within each goal that are essential to achieving the overarching goal. To be effective, objectives need to be SMART: specific, measurable, achievable, relevant to the goal, and time-bound. In addition to meeting the other SMART criteria, BDCP objectives are "achievable" because they are within the power of the water projects to achieve, and essential to BDCP success because they are "relevant to the goal[s]."
BDCP conservation measures are designed to achieve the biological objectives of the plan. Because of this, BDCP adaptive management will primarily focus on adjustment of the conservation measures to achieve the objectives as efficiently as possible.

The document generally makes it clear that the BGOs will be used to guide the implementation of conservation measures, but we have important concerns with the way objectives are used.

(1) The plan needs to clearly acknowledge and articulate that achieving the outcomes described in the Objectives is the actual basis of the entire conservation strategy and its constituent conservation measures. Continuing to achieve objectives is necessary for progress toward recovery of covered species and in many cases will be required for compliance with the terms of the BDCP permit.

(2) The plan needs to clearly articulate that the adaptive management program will focus on ensuring that plan objectives are being met. Indeed, looking at alternative management strategies to achieve program objectives is fundamentally what AM is designed to do. Failure of conservation measures to achieve objectives will, therefore, be a basis for the AMT to propose changes to conservation measures. There are several statements of the role of adaptive management in chapters 3, 6, and 7 that need to be edited to make this clear.

(3) The plan needs to make clear that objectives are themselves subject to adaptive management. Objectives are ultimately based on models describing the relationship of covered species to their environments, and changes to those models might occasion any of the following: changing an objective either up or down, adding an new objective to reflect improved understanding, removing an objective that is superseded or found not to be relevant to achieving its overarching goal. Deliberations on these issues is properly a subject for the AMT, with oversight by the AEG, POG, and ultimately the fish and wildlife agencies with final authority on adaptive management decisions. Though chapter 7 lays out a clear role for the AMT in these matters, section 3.6 is currently ambiguous and contradictory on the role of the AMT and how it makes decisions. Furthermore, section 3.6 does not adequately articulate how the AMT will exercise its responsibilities with respect to the nine enumerated steps of adaptive management, making it quite unclear whether the AMT is appropriately empowered to carry out its mission.

(4) Implementation of the conservation measures as initially described in the plan does not constitute the extent of the responsibilities of the Authorized Entities. Achieving the outcomes described in the objectives is the primary responsibility of those implementing the plan.

2.7 Effects of proposed operations on Coordinated Operations Agreement

There have been frequent discussions within various workgroups and meetings on the potential for some proposed operational scenarios to affect the Coordinated Operations Agreement (COA) agreement between Reclamation and DWR, but we were unable to find anything in the document describing this subject. If this is truly an issue, and certain operational scenarios intended to benefit covered species will require amendments to the COA agreement, this should be described somewhere in the document as part of the process necessary to implement the BDCP.

Chapter 4

Covered Activities and Federal Actions - Track changes comments submitted separately.

Chapter 5

2.8 Potential project related impacts on upstream egg and juvenile survival continue to be predicted in model results (Section 5.5 and Appendix 5.C)

OBAN, IOS and SacEFT model results continue to indicate that slight differences in Keswick release strategies between the ESO and EBC will result in increased egg mortality upstream. Lower flows in key summer and fall months increase egg mortality for winter-run and spring-run Chinook salmon and potentially other runs. SacEFT habitat results show significant impacts on spawning and rearing habitat for winter-run that are above and beyond effects of climate change.

Critical year egg mortality is very high by the LLT suggesting that a few dry/critical years in a row could potentially cause significant impacts to Sacramento River-dependent ESUs over the 50 year permit timeframe. The analysis shows that ESO criteria could result in riskier operations relating to stranding risk for juveniles (over two times more low risk years under EBC). The document should provide full SacEFT results – not just a summary of "good" year conditions. We are also interested in "poor" year conditions between the scenarios.

The analysis should provide a better examination of "worst case scenarios" for indicators like juvenile production, egg survival, escapement, etc. ESO appears to have riskier operations that result in half as many juveniles in minimum estimates of SALMOD. It may be useful to develop threshold juvenile production estimates (JPEs) of concern that can be compared between scenarios.

2.9 Additional Analysis of Feather River and Oroville Reoperations (Section 5.5 and Appendix 5.C)

Increased summertime temperatures in the Feather River may have effects on the reproductive success of sturgeon, especially for the high outflow scenario. While the high spring-time Feather River flows modeled in HOS could attract sturgeon into the Feather River from the Sacramento River, summertime releases are decreased compared to EBC2 to provide for end-of-September storage requirements. The decreased summertime river flows increase water temperatures in the high-flow channel; the resulting temperatures reported in the effects analysis would be lethal to sturgeon eggs and embryos. This is not discussed in the net effects section because lethal egg temperatures are not considered in the net effects conclusions. NMFS is also concerned with the low frequency with which the ESO and HOS meet the recommended minimum spring flows in above normal and below normal water years.

The forecasting method for Oroville releases is not clearly defined in any section. The effects of relying on Oroville to meet HOS spring-time Delta outflow requirements are reviewed in Chapter 5 (Appendix C Attachment A), and there are references to reduction of exports to also meet the outflow target. Chapter 5 Appendix C.2 presents NMFS' recommended Feather River flow schedule, but there are unexplained modifications and no description of the driving constraints or storage forecasting methodology. While these operations need to be described, the effects analysis should also address any influence of the potential temperature compliance point included in the Dec 2012 Settlement Agreement for Licensing of the Oroville Facilities. This would require compliance to 64° F from May-September in the high flow channel, and the Robinson Riffle criteria for protection of spring-run Chinook in the low flow channel, which could be affected as a result of changes in end of May storage and resulting diminishment of the cold water pool. Because of the potential biological importance of re-operation of Oroville, we recommend that the entire set of decisions and effects analysis be submitted for independent peer review to further assist in predicting these effects.

2.10 Turbidity Reduction Analysis (Chapter 5 and Appendix 5.F)

While Chapter 5 and Appendix 5.F contain discussion and evaluation of water clarity and the change in sediment delivery to the Delta due to the project, it does not specifically address the localized change in turbidity or sediment transport that may result due to reduced river velocity downstream of the north Delta diversion structures.

ICF could use DSM2 results to evaluate whether any reductions in flow velocity downstream of the intakes will reduce sediment transport capacity, causing deposition and reduced turbidity.

2.11 Poor linkage between net effects results and achievement of biological objectives (Section 5.5 and Section 3.3)

The net effects analysis needs to include a section(s) that specifically ties the results of the net effects to the achievement of the BGOs for each species. We need to be able to determine the likelihood of the various operational scenarios actually achieving the BGOs for each species. A rough examination of this issue in the current draft indicates that it may be difficult to meet the through-delta survival objectives for salmonids under the proposed operational criteria.

Chapter 6

2.12 Expansion of Changed Circumstances and adaptive responses to those Changed Circumstances (Section 6.4)

There are numerous problems with the latter sections of Chapter 6 (Sections 6.4 and 6.5). The list of foreseeable changed circumstances described in Section 6.4 needs to be significantly expanded and the range of adaptive responses available to address those changed circumstances is far too narrow and limiting. At a minimum, changed circumstances should consider all foreseeable changes in storage, conveyance and operations external to the BDCP conservation measures but that could substantially affect the CALSIM runs and therefore the effects analysis that supports the BDCP permit issuance criteria. These include: new North of Delta storage, new South of Delta storage, and new State Water Resources Control Board San Joaquin and Delta flow criteria. In general, we expect any one of these would trigger a new analysis of effects and the potential for changes to conservation measures. The Five Agencies will need to review this section and come to agreement on revising its contents prior to release of the public draft of the plan. More detailed comments on the issues with this section of Chapter 6 are provided in NMFS' "track-changes" submittal.

Chapter 7

2.13 Governance

While many of the important issues regarding the governance of plan implementation have been resolved over the last few years, one of the remaining significant issues is the lack of a clear tables and graphics describing how entities relate to each other (e.g. organization charts or flow charts) and which entities will retain final decision making power over each of the major categories of decisions to be made. We recommend that the "decision table" that was developed in the Principals workshop process be included in the document, with any necessary edits, to explain the decision-making process that was agreed to in the text.

There are also some issues regarding the role of the implementing office and its employees that remain to be resolved in Chapters 3, 6, and 7. The plan needs to be clear that adjustment of the conservation measures and other actions that are necessarily and appropriately part of adaptive management are to be managed and administered by the Adaptive Management Team, and not by the Implementation Office or any of its employees, including the Program Manager and the Science Manager.

Chapter 8

Implementation Cost and Funding Sources - Section is pending changes and was not reviewed at this time.

Chapter 9

Alternatives to Take - Track changes comments submitted separately. Intend additional review upon release of revised version.

Chapter 10

Integration of Independent Science - Track changes comments submitted separately. Intend additional review upon release of revised version.