United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825-1898

IN REPLY REFER TO

MP-100
ENV-7.00

MAR 22 2017

Mr. Barry Thom
Regional Administrator
NOAA Fisheries West Coast Region
1201 Northeast Lloyd Blvd., Suite 1100
Portland, OR 97232

Subject: Draft Proposed Amendment Related to Shasta Dam Operations from the 2009 Biological Opinion (BiOp)

Dear Mr. Thom,

This letter provides additional detailed comments on the draft proposed amendment to the components of the reasonable and prudent alternative (RPA) related to Shasta Dam operations from the 2009 Biological Opinion, transmitted by the National Marine Fisheries Service (NMFS) on January 19, 2017. The Bureau of Reclamation appreciates the opportunity to provide these additional comments in support of the ongoing dialog on potential changes to the Shasta-related components of the RPA. Enclosed are the additional comments on the draft proposed RPA amendment (Enclosure 1), draft administrative memorandum (Enclosure 2), and draft science workplan (Enclosure 3).

Reclamation supports an RPA that is focused on the accomplishment of biological objectives, rather than prescriptive operations that limit the ability to flexibly operate the entirety of the Central Valley Project (CVP) to better support the full range of requirements and beneficial uses of the system. On a daily basis, Reclamation addresses requirements and beneficial uses including the water quality requirements from the State Water Resources Control Board, coordination across the larger CVP-State Water Project (SWP) system, actions to prevent jeopardizing the continued existence of Endangered Species Act listed species throughout all parts of the CVP, and our contract commitments to water and power customers of the CVP, to name a few. We expect that an approach that focuses on operation to more biologically-based objectives should help provide for a more functional project overall, including the NMFS regulated species below Shasta Dam.

Reclamation believes that additional work must be done to ensure that the new biological objectives identified in the draft proposal are feasible, scientifically sound, and address impacts to the other requirements and beneficial uses of the CVP and SWP as outlined above. The draft proposal retains and adds additional prescriptive operations that will restrict Reclamation's

ability to ensure the operations of our water supply infrastructure are conducted in a manner that provides for the needs of the species while maintaining the balance necessary for overall operations in the complex landscape of the CVP/SWP.

Reclamation looks forward to working with NMFS as well as the other state and federal agencies and our collective stakeholders during the course of 2017 to evaluate the feasibility and potential impacts of the proposed amendment. We are fortunate this year to have the benefit of the best hydrologic conditions that California has experienced in decades, and remain confident that this year's temperature management operations on the Sacramento River will be successful given those conditions. We would also note that with the amount of precipitation this year and current reservoir conditions throughout the state, we are likely to enter 2018 in a position to support operations during that year that are highly protective of the species.

The drought of 2012 through 2015 was certainly devastating for all uses of California's limited water supply, including conditions and habitat for winter-run Chinook salmon as outlined in NMFS' draft documents. However, the drought was an extreme outlier in the history of water resources in California. Recently published studies[1,2] based on proxy data such as tree ring histories indicate that for large portions of the state encompassing many components of the CVP/SWP, by some measures the 2014 drought by itself may have been a multicentury-scale event, and the full drought sequence may have been a multimillennial-scale event or beyond. We recognize that the information gained from the drought event provides valuable insight into how we might be able to manage through more typical single and multi-year droughts. Considering the historical perspective of the drought will help to establish reasonable biological objectives and balance fish and water management actions moving forward.

The components of the draft proposed amendment that rely upon further research and development of additional tools are better suited to the larger reinitiation of consultation (ROC) on the BiOp. Given the combination of the current wet hydrologic conditions, reservoir storage, low likelihood to return to the extreme drought conditions of 2014-2015, and the need to ensure that any changes to the Shasta-related provisions of the RPA take into account the functionality and uses of the entire CVP, Reclamation does not find a compelling reason to rush through a less comprehensive process. Use of the ROC process will allow for addressing the required activities under the National Environmental Policy Act, as well as the extensive stakeholder engagement required under the Water Infrastructure Improvements for the Nation Act. We can also take advantage of water contractor resources for improving temperature management tools.

We remain committed to the efforts this year and into future years to evaluate the current draft proposal and further develop and refine the Shasta-related actions under the RPA, whether those refined actions take the form of an amendment, or a component of a new BiOp under the ROC process. We look forward to continuing to work with you on this effort, and the associated

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[1] Robeson, S.M. (2015), Revisiting the recent California drought as an extreme value, *Geophys. Res. Lett., 42,* 6771-6779, doi:10.1002/2015GL064593

[2] Griffin, D., and K. J. Anchukaitis (2014), How unusual is the 2012–2014 California drought?, *Geophys. Res. Lett., 41, 9017–9023,* doi:10.1002/2014GL062433

stakeholder outreach efforts to ensure that affected parties will have appropriate input to the process.

Should you have questions or wish to discuss further, please contact me at 916-978-5000.

Sincerely,

Pablo R. Arroyave

Pablo Arroyave
Acting Regional Director

Enclosures-3

cc: Ms. Maria Rea
Assistant Regional Administrator
California Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814

Mr. Garwin Yip
Water Operations and Delta
Consultations Branch Chief
California Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814

Mr. Paul Souza
Regional Director
Pacific Southwest Region
U. S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

Ms. Kaylee Allen
Field Supervisor
Bay Delta Fish and Wildlife Office
U.S. Fish and Wildlife Service
650 Capitol Mall, Suite 8-300
Sacramento, CA 95814

Mr. Chuck Bonham
Director
California Department of Fish and Wildlife
1416 Ninth Street
Sacramento, CA 95814

Mr. Carl Wilcox
California Department of Fish and Wildlife
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Mr. William Croyle
Acting Director
California Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

Mr. John Leahigh
Operations Control Office
California Department of Water Resources
3310 El Camino Avenue, Suite 300
Sacramento, CA 95821

Mr. Ronald Milligan
Operations Manager
Central Valley Operations Office
Bureau of Reclamation
3310 El Camino Ave, Suite 300
Sacramento, CA 95821

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cc: Continued from previous page.

Mr. Jeffrey Rieker
Deputy Operations Manager
Central Valley Operations Office
Bureau of Reclamation
3310 El Camino Ave, Suite 300
Sacramento, CA 95821

Ms. Michelle Banonis
Area Manager
Bay-Delta Office
Bureau of Reclamation
801 I Street, Suite 140
Sacramento, CA 95814

Enclosure 1

Detailed Comments on NMFS Draft Proposed RPA Adjustments Document
(Enclosure 1 to NMFS January 19, 2017 Transmittal)
March 22, 2017

General/Summary – The National Marine Fisheries Service (NMFS) provided a draft proposed amendment to the components of the reasonable and prudent alternative (RPA) related to Shasta Dam operations from the 2009 Biological Opinion (BiOp) as the first enclosure to its January 19, 2017 transmittal. As discussed in additional detail below, Reclamation believes that the draft proposed amendments should be analyzed for their feasibility, as well as impacts to Central Valley Project (CVP) and State Water Project (SWP) operations, other legal users of water, and river conditions for other fish species throughout the Central Valley (given that other rivers are impacted by Shasta Dam operations due to the integrated nature of the complete system). Additional detailed comments follow.

Page 10 – The document notes that it is based in part on multiple annual reviews, and in particular the 2015 review. Reclamation requests that there be citations as to which proposed amendments pertain to specific annual review findings.

Page 11 – The document notes the amendments are based on "lessons learned" from recent drought conditions. Reclamation recommends changing this terminology to "information gained".

Page 11 – The document refers to a phased approach to issuance of the RPA amendments. Reclamation recommends removal of much of this language, given that the language appears to assume that the amendments would have been formally issued for 2017 operations.

Page 20 – The table identifying conceptual objectives contains objectives for "recovery" and "enhancement" in Below Normal and Above Normal/Wet year types. Reclamation believes additional dialog and analysis need to be completed on the meaning, intent, and implementation of the fish management priorities identified for these categories in the table.

In addition, though Reclamation supports the goal of enhancement of the species, Reclamation questions the use of enhancement objectives in the development of an RPA.

Page 20 – The document refers to the ongoing development of temperature-dependent mortality objectives. Though Reclamation supports the concept of the use of biological objectives, Reclamation believes that the scientific basis for specific values contained in the objectives needs to be further refined prior to initial implementation to ensure the values are feasible and meet the purposes of the RPA.

Page 20/21/22 - The document identifies spring and fall storage targets for Shasta operations. Reclamation questions the feasibility of meeting these targets, particularly during Dry and Critically Dry years. This will be further explored during this year's evaluation. In addition, the targets will be the subject of further evaluation this year for the potential to cause impacts to the

CVP/SWP, other legal users of water, and river conditions for other fish species.

Specific to spring target concepts; Reclamation questions the utility of these spring storage targets in the context of fall/winter/early spring operations. However, Reclamation does believe that spring storage projections would be a useful metric for forecasting temperature management capability in the context of the development of initial allocation decisions, and recommends further discussion and development of that concept under Action I.2.3.

Page 21 – Specific temperature dependent mortality objectives are provided; as noted above, Reclamation believes that the scientific basis for specific values contained in the objectives needs to be further refined prior to initial implementation to ensure the values are feasible and meet the purposes of the RPA.

Page 22/23 - Reclamation notes that adjustment of the end of September target of 2.4 MAF will be subject to the previously referenced evaluation.

Page 27 - For the initial forecast of deliverable water discussed in Action I.2.3, Reclamation recommends removing the requirements for extensive river temperature modeling and accomplishment of specific storage targets, but rather that projected April/May storage levels be used as a surrogate for this extensive modeling to determine the likelihood to achieve temperature compliance during the temperature management season. This will provide a streamlined method to determine if initial allocations can be issued based on conservative projections of adequate storage and cold water pool going into the temperature management season. The basic concept would be that if April/May storage levels are projected to be in a range that ensures temperature compliance during the temperature management season is highly likely, Action 1.2.3.A would be triggered. If storage levels are projected to fall short, either Action 1.2.3.B or C would be triggered, depending on the specific projected storage level. The ranges for each trigger would be developed based on historic data and additional modeling that could be undertaken this year.

Page 28 - Reclamation notes that the revised March through May 15 temperature compliance metric will need to be analyzed during this year's evaluation for potential impacts to the CVP/SWP, other legal users of water, and river conditions for other fish species.

Page 28 - For Action I.2.3.A, see comment above regarding revision of the initial forecasting method (related to Page 27). For this action, Reclamation recommends removing requirements for extensive river temperature modeling and accomplishment of specific storage targets in the event projected April/May storage levels indicate the strong likelihood to achieve temperature compliance during the temperature management season.

Page 29 - For Action I.2.3.B, see comment above regarding revision of the initial forecasting method (related to Page 27). For this action, Reclamation notes the need to analyze the proposed April and May release schedule during this year's evaluation for potential impacts to the CVP/SWP, other legal users of water, and river conditions for other fish species.

Page 30 - Reclamation questions the need for defining a specific model run for forecasting

purposes, and the underlying basis of the table containing specific flow rates for use with the model run. In addition, this section (Action 1.2.3.B.3) does not appear to conform to the purpose of Action I.2.3.B, which only is designed to guide spring operations prior to development of the formal temperature management plan.

Page 30 - For Action I.2.3.C, see comment above regarding revision of the initial forecasting method (related to Page 27).

Page 32/33 - Reclamation questions the feasibility and effectiveness of meeting a seven day average daily maximum (7 DADM) metric as opposed to a daily average temperature (DAT) metric, which will be further explored as part of this year's evaluation. Reclamation believes that in certain instances, due to the averaging function and lag times associated with the metric's response to actual conditions, this metric will have the effect of driving specific operations that may provide for compliance with the metric, but be undesirable for ecosystem needs under both short term and seasonal approaches. In addition, Reclamation questions the feasibility of meeting the specific revised compliance value and location, particularly during Critically Dry years. The temperature metric, location, and value concepts from the proposal are anticipated to be further explored during this year's system-wide evaluation for their effectiveness, and potential to cause impacts to the CVP/SWP, other legal users of water, and river conditions for other fish species.

Page 36 - Reclamation requests the documentation/analysis supporting establishment of post-season survival metrics, and how those relate to the objective of avoiding jeopardy to the continued existence of the species. These metrics do not appear to be discussed in the draft administrative memo. In addition, Reclamation notes that it is not clear how the action would be carried out, and therefore how its benefits or impacts can be evaluated.

Page 40 - Reclamation notes that adjustment of Wilkins Slough minimum flows should be subject to the previously referenced evaluation.

Enclosure 2

Detailed Comments on NMFS Draft Administrative Memorandum Document

(Enclosure 3 to NMFS January 19, 2017 Transmittal)

March 22, 2017

General/Summary – The National Marine Fisheries Service (NMFS) provided a draft administrative memo in support of its draft proposed amendment to the components of the reasonable and prudent alternative (RPA) related to Shasta Dam operations from the 2009 Biological Opinion (BiOp) as the third enclosure to its January 19, 2017 transmittal. Reclamation is supportive of a shift to biologically based objectives, but as described below, does not believe there is a basis identified in the draft administrative memo document for the particular values identified in the draft proposed amendment. Reclamation believes there are similar issues with limited or absent supporting data and information in the draft administrative memo for the establishment of other compliance metrics and values contained in the draft proposed amendment. Having this information will be critical in achieving compliance with Sections 4004(a)(6)(A) and (B) of the Water Infrastructure Improvements for the Nation (WIIN) Act. In addition, information supporting the feasibility of meeting the proposed operational criteria is limited or absent, as is any information regarding impacts to CVP/SWP operations, other legal users of water, and river conditions for other fish species throughout the Central Valley (given that other rivers are impacted by Shasta Dam operations due to the integrated nature of the complete system).

In developing our comments on the documents, Reclamation worked with CVP stakeholders to learn more about their thoughts and concerns with the documents and concepts. As part of their comments, several of the stakeholders noted significant concerns with the temperature-dependent egg mortality model and the survival estimates used as a major component of the model calibration, which are both outlined in the draft administrative memo. Reclamation also has concerns with the model, which are discussed in the detailed comments section below. Stakeholder comments include concerns with calibration of the mortality model based on uncertainties in the estimates of egg numbers as well as periods of time when out-migrating juveniles are missed due to sampling outages and techniques. They also include concerns on underlying hypotheses of the mortality model, and potential for other factors to be involved with egg and fry mortality as echoed in Reclamation's comments below. Because of the concerns from both Reclamation and various stakeholders with these key components of the NMFS draft proposal, Reclamation recommends that these issues be discussed, analyzed, and resolved.

Additional detailed comments follow.

Page 1; Paragraph 1 – The document states that water temperatures that rose to "sub-lethal and lethal levels" were in part the result of "competing water demands". Reclamation does not believe that water demands resulted in the temperature issues, as there was simply not enough inflow to the reservoir to support temperature operations during those years. Reclamation recommends deleting reference to "competing water demands".

Page 1; Paragraph 1 - The document states that the "NMFS Southwest Fisheries Science Center

(NMFS-SWFSC) found that temperature dependent mortality alone resulted in the loss of approximately 77% and 85% of the population, respectively". These numbers appear to be estimates based on modeling that has not been peer-reviewed or published. Reclamation recommends revising the statement to clarify those caveats, and notes that additional questions on temperature dependent mortality estimates contained in the document can be found in other comments below.

Page 1; Paragraph 2 – The document notes that "severe temperature-related effects were not avoided in 2014 and 2015", and states that the lessons learned during the drought the basis for the adjustment to the RPA Action Suite. Reclamation notes that recently published studies[1,2] based on proxy data such as tree ring histories indicate that for large portions of the state encompassing many components of the CVP/SWP, by some measures the 2014 drought by itself may have been a multicentury-scale event, and the full 2012-2015 drought sequence leading to the conditions in 2014 and 2015 may have been at a multimillennial-scale or beyond. Though the information gained from these events is valuable in evaluating how to manage through future droughts, the low likelihood of a repeat event should be taken into consideration to ensure that an amended or future RPA protects the species within the reasonable bounds of expected future conditions.

Page 3 – The CalSim-II temperature compliance location and Shasta storage percentages listed rely heavily on the statistical stationarity of model performance which does not include the implementation of the NMFS 2009 or US Fish and Wildlife Service 2008 RPA actions.

Page 3/4; Table 1 and supporting discussion: As outlined above, for five of the eight years being cited in the table as having fallen short of the previous storage performance metrics, California was enduring a severe drought with a significantly low return frequency. Using this very short sample period at a time when an extreme event occurred as a measure of the ability to meet storage metrics in the long run is not appropriate.

Page 4/5 – The discussion of Reclamation's April/May storage analysis indicates that certain minimum storages must be met in order to meet temperature compliance. This is not the case nor intent of the analysis; the storages merely provide an early indication of the potential to meet certain temperature targets based on past data. Actual performance to any temperature metrics would be dependent on strategies taken during the course of a particular season using the supply available and conditions experienced.

Page 5; Footnote 2 – Reclamation notes that work remains to be completed to determine whether the 53° F daily average temperature at CCR performs as a surrogate for a 55° seven day average daily maximum criteria. Also, it is our understanding that the use of seven day average daily maximum criteria is different from the criteria used by NMFS in assessing temperature-dependent mortality (e.g. daily average temperature), which is generated in predictive models.

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[1] Robeson, S.M. (2015), Revisiting the recent California drought as an extreme value, *Geophys. Res. Lett., 42,* 6771-6779, doi:10.1002/2015GL064593

[2] Griffin, D., and K. J. Anchukaitis (2014), How unusual is the 2012–2014 California drought?, *Geophys. Res. Lett., 41, 9017–9023*, doi:10.1002/2014GL062433

Page 7 – The document identifies required spring and storage targets without any analysis for the specific benefits, feasibility, or impacts of meeting these targets, particularly in the year types identified. In addition, no analysis is provided to show that both the September storage targets and seasonal temperature targets can be met given the spring storage targets.

In addition, it should be noted that the use of spring storage targets by year type will require the use of runoff forecasts, which will introduce uncertainty and possibly intra-seasonal operational shifts in the event of variability within the year type, or change of year type while operating through the late winter/early spring operational season.

Page 7/8; Table 4 and supporting discussion – As outlined above, for five of the seven years being cited in the table as having fallen short of the temperature performance metrics, California was enduring a severe drought with a significantly low return frequency. Using this very short sample period at a time when an extreme event occurred as a measure of the ability to meet temperature metrics in the long run is not appropriate.

Page 8; Paragraph 1 – The document notes that a 55° F seven day average daily maximum (or equivalent) metric must be met over the most downstream redd location in every year. Reclamation questions the feasibility of this given that it simply could not be accomplished in years like 2014 and 2015 given the available water supply (as noted on Page 22 of the document), and recommends that other strategies should be developed and employed in severe drought years to maximize survivorship.

Page 9; Table 5 – The table identifying conceptual objectives contains objectives for "recovery" and "enhancement" in Below Normal and Above Normal/Wet year types. Reclamation believes additional dialog and analysis need to be completed on the meaning, intent, and implementation of the priorities identified for these categories in the table.

In addition, though Reclamation supports the goal of enhancement of the species, Reclamation questions the use of enhancement objectives in the development of an RPA.

Page 9; Paragraph 1 – Reclamation questions the use of a "newly developed" model which has not yet been subject to peer review or publication as the basis for the development of regulatory actions that have the potential to impact other beneficial uses of the water supply from Shasta Dam. In addition, based on the description, the study focuses on developing estimates of temperature dependent mortality based on modeling of temperature exposure of eggs, and comparing those to field-based fry survival estimates that result from any number of factors affecting survival. Reclamation requests additional discussion/description as to whether other (non-temperature based) factors might play a role in the survival estimates, and how those might factor in to the temperature dependent mortality modeling to produce the most accurate estimate of direct temperature impacts. Reclamation also requests additional discussion regarding access to the models and results summarized in this paragraph.

Page 10; Paragraph 2 – The document discusses historic temperature dependent mortality as if the values had been formally and accurately determined; the document should clarify that these

are estimates based on the previously discussed model, and should be caveated with associated model limitations. Further, it is not clear how these estimates support or link to any of the proposed actions in the draft proposal.

Page 10; Paragraph 4 – The document establishes biological objectives, but does not provide a basis for these objectives, and notes (as highlighted in footnote 4) that these estimates are "preliminary and subject to further analysis to understand whether the population can withstand this level of mortality and still be viable." Reclamation believes that the scientific basis for specific values contained in the objectives needs to be further refined prior to initial implementation to ensure the values are feasible and meet the objective of avoiding jeopardy to continued existence of the species.

Page 14; Paragraph 2 through Page 16; Paragraph 2 – The document states that drought conditions "over the last five years have highlighted the uncertainties in Reclamation's SRWQM and its inability to meet the regulatory requirements outlined in the CVP/SWP operations Opinion." It is not clear which regulatory requirements this statement refers to, but under any reference, Reclamation does not believe the model has failed to meet regulatory requirements. If the reference is to the inability to meet temperature objectives in 2014 and 2015, the model is not at fault, but rather the lack of water supply itself (indicating infeasibility of the requirements in certain years). The model has produced information as specified in the current BiOp, thus it is not clear what this statement refers to.

The document states that in order to make accurate forecasts "for the entire season for all of the scenarios, Reclamation needs to have all of the environmental input variables accurate: the reservoir inflows, weather, operations (gate changes, etc.), and reservoir dynamics over a 6-month period." These inputs are independent of the modeling system, and thus do not indicate fundamental flaws with the current modeling system. In addition, uncertainties inherent in these parameters will impact the ability for any modeling system to predict future outcomes.

The document states that the model "has a difficult time reflecting actual release temperature and conditions when the critical reservoir thermocline of about 52°F approaches the elevation of the TCD side gates and/or reservoir outlet works." Reclamation believes this situation represented a new understanding of the operational limitations of the physical infrastructure, not a modeling flaw.

The document describes that given "the significant simplification of the input data (which is derived from a 12-month operations outlook), the unknowns regarding future meteorological conditions, and the fact that the actual TCD does not have infinite adjustability, the model can only realistically provide a broad brush picture of future operations and cannot provide sufficient precision to determine future operations." Reclamation believes that given the complexity of the CVP/SWP, uncertainties inherent in variables such as the weather at timescales of months in the future, and fundamental limitations of simulation modeling, that no model can possibly be capable of "determining future operations" at the resolution and lead times being contemplated by these statements.

The document concludes that as a result of the perceived limitations in modeling, Reclamation

"has historically overestimated their ability to meet the temperature compliance point". Reclamation does not agree with this statement and the supporting values and figures, and believes that if these assertions are to remain a part of an administrative record for any amendments to the RPA, that a focused discussion between the agencies on this subject should occur to ensure that any statements regarding historic compliance issues represent a complete picture of the decisions and factors leading to historic performance.

The document describes buffers to address uncertainty in modeling, including the joint use of conservative meteorological inputs and hydrologic forecasts. Reclamation notes that though the use of conservativism in forecasting is appropriate given the long lead times being considered in the forecasts as well as the uncertainty in components of the forecasting, the use of these conservative inputs has the potential to increase the joint probability of the overall resultant forecast to a level that is no longer within the realm of reasonability. Instead, Reclamation recommends the two agencies continue to discuss the potential for an alternative mechanism to address early season forecasting, such as the one identified in Enclosure 1 of this response. In addition, Reclamation looks forward to working with NMFS on future modeling improvement opportunities such as those discussed in Enclosure 3 of this response.

Page 16; Paragraph 3 through Page 19 – The document contains a large amount of data regarding historic flowrates and temperatures, but it is not clear how this information supports the conclusion on page 19 that Keswick releases should be limited, and does not contain any supporting information regarding the specific flow rates contained in Table 10. In addition, this proposed maximum flow schedule does not relate to any specific action in the draft proposed amendment, thus Reclamation would recommend removal of this section of the document. Should a maximum release schedule be considered, Reclamation notes that it would require evaluation for its impacts to CVP/SWP operations, other legal users of water, and river conditions for other fish species.

Page 20; Paragraph 2 – With respect to spring holding temperature management, Reclamation questions the feasibility and effectiveness of meeting a seven day average daily maximum (7 DADM) metric as opposed to a daily average temperature (DAT) metric, which will be further explored as part of this year's evaluation. Reclamation believes that in certain instances, due to the averaging function and lag times associated with the metric's response to actual conditions, this metric will have the effect of driving specific operations that may provide for compliance with the metric, but be undesirable for ecosystem needs for both short term and seasonal approaches. The temperature metric, location, and value concepts from the proposal are anticipated to be further explored during this year's system-wide evaluation for their effectiveness, and potential to cause impacts to the CVP/SWP, other legal users of water, and river conditions for other fish species.

Page 21, Paragraph 3 – With respect to summer temperature management, Reclamation questions the feasibility and effectiveness of meeting a 7 DADM metric as opposed to DAT metric, which will be further explored as part of this year's evaluation. Reclamation believes that in certain instances, due to the averaging function and lag times associated with the metric's response to actual conditions, this metric will have the effect of driving specific operations that may provide for compliance with the metric, but be undesirable for ecosystem needs for both

short term and seasonal approaches. In addition, Reclamation questions the feasibility of meeting the specific revised compliance value and location, particularly during Critically Dry years. The temperature metric, location, and value concepts from the proposal are anticipated to be further explored during this year's system-wide evaluation for their effectiveness, and potential to cause impacts to the CVP/SWP, other legal users of water, and river conditions for other fish species.

In addition, in developing our comments on the document, Reclamation worked with CVP stakeholders to learn more about their thoughts and concerns. As part of their comments, one of the stakeholders noted similar concerns to those raised by Reclamation regarding the temperature compliance concepts. The stakeholder provided an analysis detailing how temperature-related mortality objectives could still be attained at higher temperatures. As part of this year's analyses and stakeholder engagement processes, Reclamation believes the agencies should further explore the concepts being developed by this and other stakeholders.

Page 22; Paragraphs 2 and 3 – Reclamation supports targeting temperature management at a logical location in segments of the river where spawning is occurring, and the use of an operational metric that reduces the likelihood of unintended operations such as those described in the paragraphs above pertaining to the 7DADM metric.

Page 22/23 – The document provides no supporting information for the selection of the less restrictive temperatures in certain year types. Reclamation recommends that as part of any future science workplan (as discussed in Enclosure 3 to this response), the agencies work to establish strategies for drought conditions that will maximize survivorship based on the amount of cold water resources available.

Page 24 – The document provides no supporting information for the selection of October 15 as a key date for full side gate access. Reclamation suggests this operation should be adaptively managed based on the conditions existing in any particular year.

Enclosure 3

Detailed Comments on NMFS Draft Science Workplan
(Enclosure 4 to NMFS January 19, 2017 Transmittal)
March 22, 2017

General/Summary – The National Marine Fisheries Service (NMFS) provided a draft science workplan as the fourth enclosure to its January 19, 2017 transmittal of the draft proposed amendment to the components of the reasonable and prudent alternative (RPA) related to Shasta Dam operations from the 2009 Biological Opinion (BiOp). The transmittal refers to the fourth enclosure as a "proposed science workplan". The document identifies itself as a proposed modeling framework. The latter description appears to be more accurate. Reclamation believes that the two agencies should meet and further discuss the need and objectives for the development of a science workplan, and based on a common understanding of what the workplan is intended to accomplish, develop a document that reflects near-term and long-term needs that can leverage partnerships and be sustained.

The science workplan should support ongoing processes involving the entire Central Valley Project (CVP), including but not limited to the reinitiation of consultation (ROC) on the NMFS and US Fish and Wildlife Service Biological Opinions (BiOps), activities under the Central Valley Project Improvement Act (CVPIA), compliance with the Water Infrastructure Improvements for the Nation (WIIN) Act, Bay-Delta Water Quality Control Plan update processes being undertaken by the State Water Resources Control Board, development of supporting information for decisions related to the California WaterFix project, adaptive management processes under the existing BiOps, and various projects related to the species being undertaken by stakeholders including the Collaborative Science and Adaptive Management Program (CSAMP) and the Sacramento River Settlement Contractor efforts. Reclamation believes the need for such a workplan warrants an approach that extends beyond this process to amend the Shasta-related components of the existing NMFS BiOp, and development of the workplan should be undertaken as a parallel but separate process from the amendment process. We believe there is a need to prioritize Shasta-related components of the workplan in support of this amendment process.

In October 2016, Reclamation developed a draft workplan for the development of a revised framework for operational models in support of Sacramento River temperature management. This workplan is geared towards meeting the forecasting needs of Reclamation's operations, and as such, is anticipated to support many of the physical modeling needs associated with activities under the RPA of the NMFS BiOp. Reclamation believes that as a result, some of the efforts outlined in the "Physical Models" section of the proposed framework in the NMFS draft science workplan are duplicative with efforts already underway in this workplan. Reclamation looks forward to working with NMFS to further discuss how we may be able to leverage our respective efforts by focusing on the strengths and expertise of each agency in order to minimize duplication and ultimately meet the needs of both agencies. Specifically, Reclamation envisions an approach that provides for Reclamation taking a lead role in the development of physical/operational modeling, with NMFS focusing more specifically on leading biological modeling. Both agencies should consider undertaking activities within a large, diverse, and

collaborative science enterprise that incorporates other partner agencies, stakeholders, non-governmental organizations, and academia.

Page 3/4 – The document describes work completed on an egg survival model. Based on the description and associated figures, the study focuses on developing estimates of temperature dependent mortality based on modeling of temperature exposure of eggs, and comparing those to field-based fry survival estimates that result from any number of factors affecting survival. Reclamation requests additional discussion/description as to whether other (non-temperature based) factors might play a role in the survival estimates, and how those might factor in to the temperature dependent mortality modeling to produce the most accurate estimate of temperature impacts. Reclamation also reiterates the need to address concerns raised by CVP stakeholders as discussed in Enclosure 2 to this transmittal.

Page 6 ("Reservoir" paragraph) – The document states that current monitoring and modeling of water quality in Shasta Reservoir is inadequate, and suggests additional monitoring needs. No data or information is offered to support the statement of inadequacy, nor is information offered as to what needs would be met through additional monitoring. It should be noted that Reclamation does not agree with the statement, and would encourage further dialog on any potential additional needs for expanded in-reservoir monitoring.

Page 6 ("Summary" paragraph) – The document notes the application of the modeling framework in support of other processes such as California WaterFix and meeting Delta water quality standards. This appears to support the concept of a larger process as outlined in our general comment section above.