

**Final Charge for the NMFS Reinitiation of Consultation on the Long-Term Coordinated
Operations of the CVP/SWP Biological Opinion Peer Review**

Background

Reclamation is consulting with the U.S Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act (ESA) on the coordinated operation of the Central Valley Project and State Water Project (CVP/SWP). As a part of these consultations, Reclamation has written a Biological Assessment (BA) that summarizes the effects of the Reinitiation of Consultation on the Coordinated Long-Term Operations of the CVP/SWP (ROC on LTO) on ESA-listed species and their designated critical habitats. NMFS will complete its assessment of effect and jeopardy determination in a biological opinion, expected to be completed by July 1, 2019, as directed by the October 19, 2018, White House memorandum *Promoting the Reliable Supply and Delivery of Water in the West*.

The purpose of this independent scientific peer review is to obtain the views of experts not involved in the ROC on LTO ESA consultation on the incorporation and application of best available scientific information and assessment of effects on aquatic species of the proposed CVP/SWP operations.

Panel charge

The panel will review NMFS' analytical approach, status of the species and critical habitats, environmental baseline, and effects analysis sections of the draft BiOp. The Panel will also receive relevant background information and supplemental materials to consider in their review. NMFS will be available for a conference call during the review period to provide answers to questions or address clarification needs during the review. Reviewers are expected to convene at least one conference call among themselves to discuss major findings and identify and attempt to rectify any conflicting recommendations. The review is expected to culminate with individual reports from each reviewer, according to the format provided by the hiring contractor.

Final questions for review of the draft NMFS biological opinion:

Overarching objective: Identify to what extent the analyses in the draft biological opinion are scientifically sound and defensible, with consideration of the following questions:

1. How well does the analytical approach explain how the exposure, response, and risk from project operations will be assessed for:
 - A. Individuals, populations, and diversity groups of the listed species?
 - B. Physical and biological features of designated critical habitats?
2. How effectively is the analytical approach applied in the effects analysis on the listed species and designated critical habitats?
3. To what extent does the approach for assessing effects provide a scientifically defensible approach for evaluating effects to listed species and their designated critical habitats throughout the action area?
4. How well does the draft biological opinion use best available scientific and commercial information in the effects analysis and findings?

5. Does the draft biological opinion adequately address data gaps and uncertainties? Specifically:
 - A. Are uncertainties and assumptions in the effects analysis clearly stated and reasonable based on current scientific knowledge?
 - B. How extensively are gaps in aquatic species life history information considered and appropriately addressed?
6. How adequately does the draft biological opinion address the key operational effects of the proposed action? Specifically:
 - A. Do the analyses provide sound information and analyses to adequately characterize the effects of operations on spawning, incubating, rearing, and outmigrating salmonids and sturgeon?
 - B. How thoroughly do the data, analyses, and findings presented in the biological opinion capture the risks or benefits to individuals and populations, and to critical habitat, from the proposed action? Are there significant risks or benefits that have been overlooked or other scientific information that should be considered?
 - C. Have the appropriate analytical tools (i.e., models) been used for the analysis and what, if any, additional currently available tools should have been considered? Were available models appropriately applied and interpreted in the analysis?
7. To the extent that reviewer expertise allows informed review of Central Valley water temperature guidance (see Additional References below as needed):
 - A. Does the EPA (2003) water temperature guidance protect Chinook salmon on CVP rivers and creeks, and what implications do newer studies have for considering effects on salmon?
 - B. How appropriate is the application by Anderson (2018) of age-dependent thermal mortality and spatially-dependent background mortality to understanding early life history of winter-run Chinook salmon and temperature management planning? Are the effects, including uncertainties, of this new approach captured in the analysis?
8. To the extent that reviewer expertise allows informed review of analyses of effects of Delta conditions:
 - A. How well are the near-field, mid-field, and far-field effects described for different potential volitional and entrainment migration paths in the Delta (e.g., north Delta, Sacramento River, central Delta, San Joaquin River, south Delta, salvage, etc.) for different species and different basins?
 - B. How well does the period of record in the Delta Salvage Model (1995-2009) reflect the conditions of the proposed action given the change in Old and Middle River management (from 2009 when NMFS' 2009 Opinion was issued and implemented)? What period of record does the panel recommend to generate a seasonal pattern of loss for use in comparing between the operational scenarios (i.e., PA and COS)?

Draft Materials for Independent Science Panel Review

Advance Review Materials (Available April 23, 2019)

October 19, 2018, White House Memorandum

February 5, 2019, Biological Assessment on the Reinitiation of Consultation of the Coordinated Long-Term Operations of the CVP/SWP

CWF Biological Opinion Analytical Approach

2009 NMFS OCAP Biological Opinion (recommend Section 11.0 Reasonable and Prudent Alternative)

Delta Science Program Long-Term Operations of the Biological Opinion Peer Review Reports

Previous OCAP Consultation Peer Review Reports

Biological Opinion Section Review Materials (Available June 3, 2019)

Note to Reviewers

Section 2.1 Analytical Approach

Section 2.2 Status of the Species and Critical Habitats

Section 2.3 Action Area

Section 2.4 Environmental Baseline

Section 2.5 Effects of the Action to the Species and Section 2.6 Effects of the Action to Critical Habitat

Section 2.5.1 Stressor Descriptions and Responses

Section 2.5.2 and Section 2.6.2 Upper Sacramento/Shasta Division

Section 2.5.3 and Section 2.6.3 Clear Creek Division

Section 2.5.4 and Section 2.6.4 American River Division

Section 2.5.5 and Section 2.6.5 Bay-Delta Division

Section 2.5.6 and Section 2.6.6 Stanislaus River (East Side) Division (combined with next section)

Section 2.5.7 and Section 2.6.7 San Joaquin River Division (combined with previous section)

Section 2.5.8 Southern Resident Killer Whale Analysis

Section 2.5.9 Life Cycle Models

Section 2.5.10 Climate Change

Appendices (provided for reference only; these are largely not NMFS documents and are not to be reviewed)

Appendix Delta Bibs

Appendix H WRLCM

Appendix I DPM IOS and SALMOD model descriptions

Appendix J Methods for Loss Analysis-Description from the CWF Biological Assessment

Appendix K Reclamation Salmon Mortality Model description

Appendix L Methods for SIT Model Floodplain Habitat Analyses for the Rivers and Bypasses

Appendix SRP

Additional References (provided in reverse order of publication and for reference only; these are largely not NMFS documents and are not to be reviewed)

Del Rio, A.M., B. Davis, N.A. Fanguie, A.E. Todgham. 2019. Combined Effects of Warming and Hypoxia on Early Life Stage Chinook Salmon Physiology and Development. *Conservation Physiology* 7:1-14. doi: <http://dx.doi.org/10.1093/conphys/coy078>.

Zillig, K.W., Lusardi, R.A., Fanguie, N.A. 2018. Variation in Thermal Eco-physiology among California Salmonids: Implications for Management. Report to the Central Valley Region Water Quality Control Board. CWB Review of Literature regarding Thermal Tolerances of California Salmonids. UC Davis Agreement #: D16-15001.

Anderson, J.J. 2018. Using River Temperature to Optimize Fish Incubation Metabolism and Survival: A Case Study for Mechanistic Models. Preprint posted January 1, 2018. doi:<http://dx.doi.org/10.1101/257154>.

Martin, B.J., A. Pike, S.N. John, N. Hamda, J. Roberts, S.T. Lindley, E.M Danner. 2017. Phenomenological vs biophysical models of thermal stress in aquatic egg.s *Ecology Letters* 20: 50-59.

Verhille CE, English KK, Cocherell DE, Farrell AP, Fanguie NA (2016) High thermal tolerance of a rainbow trout population near its southern range limit suggests local thermal adjustment. *Conserv Physiol* 4(1): cow057; doi:10.1093/conphys/cow057.

Myrick, C.A. and J.J. Cech Jr. 2004. Temperature Effects on Juvenile Anadromous Salmonids in California's Central Valley: What Don't We Know? *Reviews in Fish Biology and Fisheries* 14:113-123.

U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Region 10 Office of Water, Seattle, WA