September 14, 2012

Mr. Charles R. Hoppin
Chairman
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95812-0100

Dear Mr. Hoppin:

We thank the State Water Resources Control Board (SWRCB) members and staff for the opportunity to submit comments for the Comprehensive (Phase 2) Review and Update to the Bay-Delta Plan and its Workshop #2: Bay-Delta Fishery Resources.

NOAA's National Marine Fisheries Service (NMFS) has jurisdiction over marine resources, including anadromous salmon, steelhead, and sturgeon that migrate through and rear in the Sacramento-San Joaquin Delta (Delta). NMFS administers the Endangered Species Act (ESA) for listed anadromous fishes. In the Central Valley and Delta these include: Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run Chinook salmon (*O. tshawytscha*), California Central Valley steelhead (*O. mykiss*), and North American green sturgeon (*Acipenser medirostris*). In addition, NMFS has jurisdiction over managed species pursuant to the Magnuson-Stevens Conservation and Management Act, which include all Chinook salmon races in the Central Valley (including fall-run and late fall-run Chinook salmon).

General Comments

Insufficiencies in the quality and quantity of Delta flows have contributed to the decline of the Delta ecosystem. Unsustainable conditions in the Delta have contributed to species declines. Last year's Central Valley spring-run Chinook salmon population was one of the lowest since the mid-1990s. Last year's winter-run Chinook salmon population was the lowest since 1994.

Adequate flows are an essential component of habitat for all life stages of listed and non-listed anadromous fish, both upstream in rivers and in the Delta. Flows affect cues for both upstream and downstream migration, affect access to and quality and quantity of spawning and rearing habitat, affect temperatures necessary for maintaining spawning, egg incubation and juvenile rearing, and are positively correlated with juvenile salmon survival. Delta flow criteria (as well as upstream flow needs) necessary to protect public trust resources in the Delta were submitted by NMFS on February 16 and April 14, 2010, in our role of offering technical assistance to the Delta Flow Criteria Informational Proceedings. Additional information was also sent on April

25, 2012 to support the current SWRCB effort in updating the Bay-Delta plan. We continue to stand ready to assist the SWRCB in its efforts to develop objectives for flow, temperature, and other conditions necessary for a Delta ecosystem that can support healthy fish populations.

Section 7 of the ESA requires that Federal agencies insure that their actions do not jeopardize the continued existence of threatened or endangered species or adversely modify their designated critical habitat. While section 7 requires that the appreciable reduction in the likelihood of recovery be considered in the jeopardy analysis, section 7 itself does not require a Federal action to ensure recovery of the species. Rather, section 7 only bars Federal agencies from taking actions that would reduce appreciably both the likelihood of survival and recovery of a species. Consequently, prescriptions in an ESA biological opinion are not necessarily what is required for full recovery of the species.

For example, in June 2009, NMFS issued *the Biological and Conference Opinion (BiOp) on the Long-Term Operations of the Central Valley Project (CVP) and State Water Project (SWP)*, pursuant to section 7 of the ESA. Requirements in the reasonable and prudent alternative (RPA) should not be construed as necessary to recover the anadromous fish species or the habitats that they depend on. The flow protections described in the project description and RPA are the minimum flows necessary to avoid jeopardy. The jeopardy legal standard is that which would "appreciably reduce the likelihood of survival or recovery." The Delta flow criteria necessary to "protect public trust resources" may not be the same as those called for in the NMFS BiOp, and will likely be greater than those described in the NMFS BiOp. In addition, NMFS' main focus in developing the RPA was, as section 7 requires it must be, on the proposed Federal action and alternative actions that can be taken by the U.S. Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR) in Central Valley Project and State Water Project controlled streams on the Sacramento and San Joaquin Rivers and their tributaries, rather than actions that could also be taken by the many other non-federal actions in those watersheds. Operations on some San Joaquin and Sacramento River tributaries were not within the scope of the consultation. For example, flows on the Merced and Tuolumne rivers, tributary to the San Joaquin River, influence flows at Vernalis, but are not part of the Federal action. In addition, the only independent populations of spring-run Chinook salmon, which are important to the viability of the species, are in Butte, Mill, and Deer creeks, all of which are not within the scope of the consultation.

We look forward to continued collaboration with the SWRCB, the California Department of Fish and Game, the U.S. Fish and Wildlife Service (FWS), U.S. Environmental Protection Agency, Reclamation, DWR and other interested parties to develop flow objectives and other resource management options that can be used throughout the Delta watershed to provide effective protection of resources held in the public trust.

New Information

The SWRCB notice for this workshop included a request for new science or information that was not addressed or included in the 2009 Staff Report and 2010 Delta Flow Criteria Report. Since those reports were released, a number of related information and materials have been produced that are related to Bay-Delta fishery resources and, in particular, salmonids. These include, inter alia:

- Annual reviews of the NMFS BiOp and independent review panel reports in 2010 and 2011
- NMFS' 2009 RPA with 2011 amendments[1,2]
- Joint Stipulation for April-May 2012 Operations[3] and Technical Memorandum to Guide Adaptive Management of OMR during April and May 2012 [4]
- NMFS Sacramento River Temperature Forecasting and Decision Support Tool [5]
- NMFS 5-year Status Reviews for Central Valley listed Salmonids[6]
- Escapement estimates of Chinook salmon in the Central Valley [7]
- Bay-Delta Conservation Plan (BDCP) related documents[8]
- National Academy of Science reviews of the FWS and NMFS BiOps[9] and Bay-Delta Management[10]

In addition, NMFS anticipates that three more relevant pieces of information are forthcoming that will also be relevant to the Board's update of the Bay-Delta plan. The first is our final Recovery Plan for Central Valley Salmon and Steelhead, which is expected to be released in December 2012. The second is a complete life-cycle model for winter-run Chinook salmon that is expected to be completed in December of 2013. The third is a paper that is co-authored by NMFS, FWS, DWR and DFG, that discusses migration patterns of juvenile winter-run Chinook salmon through the Delta.

2010 and 2011 NMFS BiOp Annual Reviews and RPA amendments

The NMFS 2009 BiOp states that, "not later than November 30 of every year, in conjunction with the [Delta Science Program], Reclamation and NMFS shall host a workshop to review the prior water years' operations and to determine whether any measures prescribed in the RPA should be altered in light of information learned from prior years' operations or research. After completion of the annual review, NMFS may initiate a process to amend specific measures in this RPA to reflect new information, provided that the amendment is consistent with the Opinion's underlying analysis and conclusions and does not limit the effectiveness of the RPA in avoiding jeopardy to listed species or adverse modification of critical habitat. (NMFS' BiOp, section 11.2.1.2, starting on page 583)"[11]

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[1] Preliminary Proposals for Adjustments of Various OCAP RPA Actions, November 8, 2010 - http://www.swr.noaa.gov/ocap/NMFS%20proposed%20operational%20adjustments%202010.pdf

[2] Track Changes Version of the 2009 Reasonable and Prudent Alternative that Includes Only the Pages that have 2011 Amendments, April 7, 2011- http://swr.nmfs.noaa.gov/ocap/040711_OCAP_opinion_2011_amendments.pdf

[3] http://swr.nmfs.noaa.gov/ocap/Joint_Stipulation_re_April_May_2012_operations_filed_011912.pdf

[4] Technical Memorandum to Guide Adaptive Management of OMR during April and May 2012 for the Protection of listed San Joaquin Basin Steelhead, March 16, 2012. http://swr.nmfs.noaa.gov/ocap/2012-03-16_Joint_Stipulation_Tech_Memo.pdf

[5] http://oceanview.pfeg.noaa.gov/RAFT/

[6] http://www.nmfs.noaa.gov/pr/listing/reviews.htm

[7] http://www.calfish.org/tabid/104/Default.aspx

[8] [Insert source]

[9] NAS. 2010. National Academy of Science Report: A scientific assessment of alternatives for reducing water management effects on threatened and endangered species in California's Bay Delta., http://www.nap.edu/catalog/12881.html.

[10]

[11] http://www.swr.noaa.gov/ocap.htm

In 2010, NMFS, FWS and Reclamation presented proposals for adjustments to various BiOp RPA actions to the Independent Review Panel (IRP). On November 8 and 9, 2010, the Delta Science Program (DSP) hosted a public workshop to provide an IRP a forum for presentations and discussion of previously submitted technical reports. Following the workshop, the IRP produced a report (Anderson *et al.* 2010[12]) that included recommendations and responses to proposals and information presented in the review process. NMFS and Reclamation staff reviewed the report carefully and worked together to develop an amendment to the RP A.

On April 7, 2011, NMFS issued an amended RPA[13], consistent with IRP recommendations that relate to the actions and implementation procedures. In the transmittal letter, NMFS also used suggested improvements in real time operations that did not require amending the RPA, determined priorities for further research, and reviewed compliance with the RPA as written in 2009. One of these included the new NOAA/National Atmospheric and Space Administration (NASA) model that could improve temperature predictions on the mainstem Sacramento River. The NMFS Southwest Fisheries Science Center (SWFSC) presented this model to the IRP at the November 8, 2010 workshop and the IRP supported the use of this tool. NMFS continues to support the use of this tool, and has coordinated with the SWFSC and the Sacramento River Temperature Task Group to use the NOAA/NASA model to improve real time operations on the Sacramento River. The model was completed in late 2011 and is being used for a 1-year pilot period starting in 2012.

The DSP again convened a public workshop in Sacramento, California on November 8 and 9, 2011, to provide an IRP a forum for presentations, discussion of previously submitted technical reports, and review the water operations and regulatory actions of the RPA during the 2011 water year. Following the workshop, the IRP produced a report (Anderson *et al.* 2011[14]) that noted that the 2011 Water Year (WY) was classified as wet in both the Sacramento and San Joaquin river watersheds. Consequently, most RPA actions that would have constrained water exports under drier conditions were neither triggered nor applied in WY 2011. Overall, the IRP noted that after only two years of operating under the RPA actions, it was still too early to make definitive assessments of long-term effects on listed species populations, but there was little evidence to indicate any change in the status of the listed species even in the short-term. No amendments were made to the RPA as a result of this review.

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[12] Anderson, J.J., R.T. Kneib, S.A. Luthy and P.E. Smith. 2010. Report of the 2010 Independent Review Panel (IRP) on the Reasonable and Prudent Alternative (RPA) Actions Affecting the Operations Criteria and Plan (OCAP) for State/Federal Water Operations. Prepared for: Delta Stewardship Council, Delta Science Program. December 9, 2010. 39 p.
http://deltacouncil.ca.gov/events/science-program-workshop/workshop-ocap-integrated-annual-review

[13] http://www.swr.noaa.gov/ocap.htm

[14] Anderson, J.J., J.A. Gore, R.T. Kneib, M. Lorang and J. Van Sickle. 2011. Report of the 2011 Independent Review Panel (IRP) on the Reasonable and Prudent Alternative (RPA) Actions Affecting the Operations Criteria and Plan (OCAP) for State/Federal Water Operations. Prepared for: Delta Stewardship Council, Delta Science Program. December 9, 2011. 47 p.
http://deltacouncil.ca.gov/events/science-program-review/2011-operations-criteria-and-plan-ocap-annual-review

2012 Joint Stipulation
In January 2012, Public Water Agencies (PWA), State of California and Federal agencies filed a joint stipulation[15] in the litigation relating to the NMFS BiOp regarding project operations during April and May 2012. The parties stipulated that, if a rock barrier were installed at the head of Old River, the SWP and CVP would operate within an adaptive range of Old and Middle River (OMR) flows in lieu of operating to the San Joaquin inflow:export ratio (Action IV.2.1) specified in the RPA of the NMFS BiOp.

The objectives of the joint stipulation were to: (1) provide minimum protections for out

- migrating juvenile steelhead by managing flow conditions in the Delta in a manner expected

to allow salmonids to successfully exit the Delta; (2) attempt to increase water exports consistent

with (1), above; and (3) generate real - time tracking information to better understand how

pumping rates, flows in Old and Middle River and juvenile migrations relate to one another. In addition to installing a rock barrier, the stipulation called for OMR flows to be managed at an

adaptive range between - 1,250 and - 3,500 cubic feet per second (cfs) during April, and

between - 1,250 and - 5,000 cfs during May. Export levels would be adjusted to ensure

adequate protection was afforded to out - migrating steelhead.

A planning committee, comprised of representatives from the Federal and State agencies, as well

[15] http://swr.nmfs.noaa.gov/ocap/Joint_Stipulation_re_April_May_2012_operations_filed_011912.pdf

as technical experts from non - governmental organizations and the PWA, was involved in two workshops (an acoustic tag workshop on February 3, 2012, and a technical workshop on OMR management on February 7, 2012), and subsequent discussions regarding the design of the acoustic tag experimental study and potential triggers for OMR management during spring 2012. This resulted in two approaches for managing OMR flows for the protection of San Joaquin basin steelhead: one based a method using the particle tracking model (PTM) for the period April 1 - 15, and another based on in-season monitoring of acoustically - tagged sentinel steelhead for the period April 16 - May 31. Receivers to monitor the sentinel steelhead migration were established at a location in the southern Delta, known as Railroad Cut, specifically selected as an indication that the steelhead were migrating toward the pumps.

The details of the implementation, per the joint stipulation, are provided in NMFS' technical memorandum that was issued on March 16, 2012[16]. The reason why PTM was used for April 1 - 15, 2012, was that the experiment with tagged fish was delayed two weeks due to an unanticipated equipment requisition problem. Real - time operations were then carried out by weekly and/or daily decision - making throughout April and May, 2012. NMFS then made the final determinations on OMR flows shortly thereafter and explained them in writing and posted them on the NMFS' website[17].

[16] http://swr.nmfs.noaa.gov/ocap/2012-03-16_Joint_Stipulation_Tech_Memo.pdf
[17] http://www.swr.noaa.gov/ocap/2012_stipulation.htm

Over 160 acoustic tagged hatchery steelhead were released into the San Joaquin River just downstream of Stockton every two weeks, beginning April 15. OMR flow limits were set at varying levels for each two-week period and only reduced (*i.e.*, made more positive) if a set amount of acoustic tags were detected at the Railroad Cut. The export levels were adjusted to ensure adequate protection was afforded to out-migrating steelhead.

This experiment was the first of its kind, to study the fine scale movements of acoustically-tagged steelhead within and throughout the Delta, and to utilize some of the data to inform in-season management and water operations. A sizable portion of the tagged fish (25-30 percent during each period), more than expected, turned into the southern Delta under all OMR flow conditions. While the results were not what were predicted, the information generated on migration routes and survivals across variable operating conditions will be useful in order to inform decision-making for project operations, and manage south Delta operations and other activities to improve fish survival efficiently and effectively. Full analysis and conclusions of the acoustic study is still ongoing.

The parties continue to analyze and discuss the results of the spring acoustic study and are working on the remaining parts of the stipulation, including ongoing efforts to learn more about the fine-scale movement of steelhead throughout the wider delta. NMFS expects that the data from the acoustic study, in combination with results from other experimental studies, can be used to evaluate some of the many assumptions that that were used this year and inform management approaches for operations in 2013.

Status Reviews and Returns/Migration studies

Section 4(c)(2)(A) of the ESA requires that NMFS conduct a review of listed species under its jurisdiction at least once every 5 years ("5-year reviews"). Pursuant to section 4(c)(2)(B) of the ESA, we then determine whether any species should be delisted and removed from the list, reclassified from endangered to threatened, or reclassified from threatened to endangered on the basis of such reviews. In conducting 5-year reviews, we consider the best scientific and commercial data, including new information that has become available since the last listing determination or most recent status review of a species.

On March 18, 2010, NMFS announced the initiation of 5-year reviews for listed Pacific salmon ESUs and steelhead DPSs in California, Oregon, Washington, and Idaho (75 FR 13082) and requested new information regarding the biological status of these ESUs and DPSs and the factors that affect them from the public, concerned governmental agencies, Tribes, the scientific community, environmental entities, and other interested parties. NMFS announced our completed 5-year reviews for Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, and Central Valley steelhead on August 15, 2011. After considering the best available information, our 5-year reviews recommend that each of these species should remain listed as determined in 2005 and 2006[18].

The SWRCB should also consider other updated information on the status of salmonids[19],

[18] http://www.nmfs.noaa.gov/pr/listing/reviews.htm

[19] http://www.calfish.org/tabid/104/Default.aspx

including the role of flows in the timing and duration of juvenile rearing and migration through the Delta, to inform potential changes to the Bay- Delta Plan relating to Bay- Delta salmonids. NMFS remains concerned about the continued decline and low numbers seen in the winter-run Chinook salmon population (see figure 1) and suggest the SWRCB consider this when looking at all beneficial uses, in conjunction with the 2010 Delta Flow Criteria Report.

[Insert Winter-run abundance graph here]

The DFG has provided further evidence for modifying water quality objectives in the 2006 Bay-Delta Plan to incorporate additional Delta Cross Channel gate closures, in their written comments to this proceeding. NMFS also provided comments on new information supporting additional Delta Cross Channel (DCC) closures in our April, 25, 2012, comments (NMFS, 4/25/12). There is now a report available that describes the benefits of closing the Delta Cross Channel gates for up to 10 days in October to decrease straying of adult Chinook salmon returning to the Mokelumne River (Draft Environmental Assessment regarding a Delta Cross Channel Temporary Closure Multi-year Study; USBR, DOI, August 2012). It would be very helpful to develop future studies that can describe where winter run are rearing in the Delta. That would help with DCC closures and the probability of incidental migration through Three Mile Slough to central/south Delta.

In addition to this new information regarding the Sacramento River, FWS has provided evidence for modifying the San Joaquin River Flow and Southern Delta Salinity Objectives in the 2006 Bay-Delta Plan to achieve the CVPIA's Anadromous Fish doubling goal in 9 generations, in their written comments to this proceeding and in previous comments to the board[20] (DOI, February 8, 2011, page 18). We also agree that the Board and Board staff should review the 2010 VAMP annual report[21] (SJRG, 2011) to inform changes to the Bay-Delta plan with information that was not available for the 2009 staff report and the 2010 Delta Flow Criteria Report. Further support for this is included in FWS comments to this proceeding.

Sturgeon Distribution Data

In May 2012, the FWS and the University of California, Davis released the 2011 San Joaquin River Sturgeon Spawning Survey First Annual Report[22]. Sturgeon distribution data on the San Joaquin River is currently limited to anecdotal information and DFG sturgeon report card data. The report included a summary of CDFG's sturgeon report card data from 2007 to 2010. During those years, anglers reported catching 158 white sturgeon (*Acipenser transmontanus*) and 6 green sturgeon on the San Joaquin River upstream from Stockton[23,24,25,26]. Based on location

[20] [Insert citation]

[21] [Insert citation]

[22] Gruber, J.J., Z.J. Jackson, and J.P. Van Eenennaam. 2012. 2011 San Joaquin River sturgeon spawning survey. Lodi Fish and Wildlife Office, Anadromous Fish Restoration Program, U.S. Fish and Wildlife Service, Stockton, California.

[23] Gleason, E., M. Gringas, and J. DuBois. 2008. 2007 sturgeon fishing report card: preliminary data report. California Department of Fish and Game, Stockton, California.

[24] DuBois, J., M. Gringas, and R. Mayfield. 2009. 2008 sturgeon fishing report card: preliminary data report. California Department of Fish and Game, Stockton, California.

[25] DuBois, J., B. Beckett, and T. Matt. 2010. 2009 sturgeon fishing report card: preliminary data report. California Department of Fish and Game, Stockton, California.

information gathered from the above, the survey included investigations of anadromous sturgeon spawning, from 18 April 2011 to 16 May 2011, on the San Joaquin River between river kilometer (RK) 119 and RK 148. Paired egg mats were deployed and twenty-three white sturgeon eggs were collected, the majority of which were viable and staged. The collected eggs likely represented a single spawning event. The survey confirmed the first documentation of white sturgeon spawning in the San Joaquin River.

Bay Delta Conservation Plan (BDCP)
In April 2011, the Delta Science Program convened a group of independent science advisors to assess the availability of scientific data for, and help complete, goals and objectives for covered fish species. The independent science advisors presented their findings and recommendations in June of 2011[27]. Based on the recommendations and ongoing discussions with agency and external technical experts, BDCP biological goals and objectives are being developed for the BDCP's 11 covered fish species.

Some of the targets in the biological objectives are expressed as a population metric such as species growth or survival. This approach, recommended by the science advisors, addresses important uncertainties related to the efficacy of the conservation measures for the covered fish. Biological objectives with specific population metrics are being developed to ensure that they can be measured accurately and achieved by factors within the control of the BDCP. Notwithstanding the several objectives still under discussion, many of the longfin smelt and salmonid objectives are complete, for purposes of the draft BDCP, along with all of those for the remaining fish species[28]. The SWRCB and SWRCB staff should consider these objectives, once they are completed, when updating the 2006 Bay-Delta plan.

Also in 2011, the Five-Agency Adaptive Range Technical Team, consisting of staff from DWR, DFG, Reclamation, FWS, and NMFS, was tasked with identifying a range of water operations for the proposed BDCP that would be part of an adaptive management plan. The Technical Team selected the water operations parameters that they felt were most important to the goals of water supply reliability and ecosystem restoration[29]. These parameters included: North Delta bypass flows, Fremont Weir flows, Delta Cross Channel operations, Old and Middle River (OMR) flows, summertime export location, San Joaquin fall pulse-flows, Head of Old River Barrier (HORB) operation/installation, and fall and spring Delta outflow. Their report also includes a comment on the methodology used to calculate the Delta export to inflow ratio under the proposed operations.

Their draft report summarizes information, including existing and potential new "waypoints", that the Team thought should be considered when developing an adaptive range. The report is a

[26] DuBois, J., T. Matt, and T. MacColl. 2011. 2010 sturgeon fishing report card: preliminary data report. California Department of Fish and Game, Stockton, California.
[27] Insert citation
[28] [Insert BGO citation]
[29] 5-Agency Adaptive Range Technical Team, December 2011, A Brief History of BDCP 'Water Operations Waypoints' to Inform Selection of an Adaptive Range, http://baydeltaconservationplan.com/BDCPPlanningProcess/DocumentsAndDrafts.aspx

compilation of those water operations proposals presented as a series of waypoints for each parameter. They suggest additional waypoints for some operations scenarios and highlight the need for discussion of additional waypoints in others. These cases include: North Delta diversion bypass flows, Fremont Weir adult fish passage flows, Delta Cross Channel gate operations, summertime export location, and February-June Delta outflow.

The decision tree process in the BDCP is intended to address the ability of alternative operating criteria, in combination with other conservation measures, to meet the BDCP's biological goals and objectives and ensure water supply reliability through a structured, scientifically-driven process prior to operation of a new North Delta diversion. This decision tree process will produce new scientific information through the testing of specific scientific hypotheses relating to the ability of certain specific alternative operating criteria to contribute to achieving the biological goals and objectives of the BDCP. This information will start to become available once the 2006 Bay Delta Water Quality Control Plan is updated and should be considered in the SWRCB's adaptive management processes. As currently conceived, the BDCP also will include a collaborative science process overseen by and adaptive management team. This process should inform the larger SWRCB process for adjusting Delta outflow objectives.

National Academies of Science Reviews

Given the complex backdrop surrounding the California Bay Delta and the importance of this water source to human and ecosystem needs, Congress and the Departments of the Interior and Commerce asked the National Research Council (NRC) to review the scientific basis of actions that have been taken and that could be taken for California to achieve simultaneously both an environmentally sustainable Bay-Delta ecosystem and a reliable water supply. The NRC addressed this task from 2010-2012, resulting in three reports.

The first report was completed in 2010 and focused on scientific questions, assumptions, and conclusions underlying water-management alternatives in the FWS and NMFS BiOps[30]. The second report was in 2011 and focused a a review of the current draft of the BDCP and its effects analysis. The third report was released in 2012 and addresses how to most effectively incorporate science and adaptive management concepts for management and restoration of the Bay-Delta[31]. Both of these reports have information that the SWRCB should review when updating the Bay Delta Plan. Specifically, chapters 1 and 6 of the 2010 report would be relevant to the hydrology and NMFS RPA for salmon and steelhead in the Delta region.

For the 2012 report, chapters 2 and 3 are the most relevant to Bay Delta fishery resources but other information in the report could be useful to the SWRCB. For example, the NRC concluded that "statistical evidence and models suggest that both flows and flow paths are critical to population abundance of many species in the Bay-Delta…Thus, it appears that if the goal is to sustain an ecosystem that resembles the one that appeared to be functional up to the 1986-93 drought, exports of all types will necessarily need to be limited in dry years, to some fraction of unimpaired flows that remains to be determined. Setting this level, as well as flow constraints for wetter years, is well beyond the charge of this committee and accordingly we suggest that this is best done by the SWRCB, which is charged with protecting both water rights holders and the

[30] [Insert citation]

[31] Insert citation

public trust. (NAS, 2012, p.105)"

Science gaps and uncertainty

The SWRCB notice for this workshop also included a request for comments regarding how the SWRCB should address scientific uncertainty and changing circumstances, include climate change, invasive species and other issues in its update of the Bay-Delta Plan.

Some of the current data gaps include accurate and precise survival estimates, which are needed for all Central Valley runs of salmon and steelhead, both for San Joaquin and Sacramento Delta corridors. There are currently limited empirical data to directly estimate Delta survivals and establish objectives for these species. The best estimates are from U.S. Geological Survey acoustic tag studies that use hatchery late fall-run and fall - run Chinook salmon. Other considerations for salmonid survival objectives include worsening baseline conditions due to climate change, potential effects of upstream and ocean conditions on Delta survivals, hydrologic year type, and size of fry versus smolts for different runs.

A salmonid life - cycle model, currently under development by NMFS, will more accurately predict salmonid survival in response to ecological conditions than methods to date. Completion of this model is expected in December 2013.

The salmonid life - cycle model will provide the analytical tool necessary to:

- Compile life stage - specific survival estimates for each of the Chinook runs and steelhead for Sacramento and San Joaquin rivers;
- Consolidate survival estimates for three periods: pre-, through, and post - Delta survivals;
- Calculate cohort replacement rates; and
- Determine required improvement in Delta survival to achieve cohort replacement rates

during the 15-year and 50-year time frames analyzed in the BDCP.

NMFS agrees with other Federal and State agencies that the SWRCB should address these data gaps, and other scientific uncertainties and changing circumstances, with a specific adaptive management plan and establish objectives that reflect a precautionary approach. In NMFS's February 16, 2010, written summary submitted to the SWRCB for the Delta Flow Criteria Proceedings, we said,

"The SWRCB is likely to face two kinds of uncertainty in the process of establishing Delta flow criteria:

(1) uncertainty as to what flows each species requires for each life stage under different hydrological conditions, and

(2) uncertainty as to how current conditions will change over time and lead to changes in flow needs.

In a system as complex as the Delta, it is impossible to gather enough data to describe key processes, evaluate important variables, and predict results of management actions with absolute certainty, especially in light of the climate disruption which is already evident in the Delta. In addition, analyses are subject to different interpretations by interest groups, and professional judgment plays a role in management decisions.

NMFS encourages the SWRCB to establish initial flow criteria that provide a margin of safety for fish populations dependent on the Delta, including full public trust protection of fishery resources. Monitoring and adaptive management processes can be used to refine flows as they are incorporated into regulatory processes at a later date. Due to the highly imperiled status of many species, if flows are set too low initially and monitoring demonstrates that they are inadequate, some species could be extirpated. Protection of imperiled species in the face of uncertainty requires a precautionary approach. " (NMFS 2010).

Although there is uncertainty, we do believe increased flows will benefit native fishes, including salmonid survival through the Delta and an adaptive management program is needed to further define and refine how to achieve the stated biological goals and objectives in the SWRCB's 2010 flow criteria report.

Conclusions

While there has been a number of new studies and available information since the 2009 Staff Report and 2010 Delta Flow Criteria Report, there continues to be strong support for updating the 2006 Bay-Delta Plan objectives that support the goals and biological objectives identified in the 2010 flow criteria report (SWRCB, 2010, pages 14 and 43). NMFS also recommends that modifications to the Delta Cross Channel Gates, San Joaquin River Flow and Southern Delta Salinity objectives be made, in line with the comments and references contained here and in the submissions of the FWS, EPA and DFG.

As noted in the 2012 NRC Report, *Sustainable Water and Environmental Management in the California Bay-Delta* (NAS 2012, p.7), "Given the diverse set of organisms and processes that constitute the Delta ecosystem, the ultimate success of any approach targeted to particular

species seems doubtful. In contrast, broad standards established admittedly in the face of some uncertainties, do provide broad protection for the ecosystem, *i.e.*, they adhere to the precautionary principle of doing no harm, but do so at higher water cost, potentially using water that could be used to support economic activity, sanitation, and other needs…Although many stressors are interacting in a complex way, some conclusions are possible. For migratory salmonids, and probably green sturgeon, dams are significant stressors. They impede passage, cause the loss of spawning and rearing habitat, change the abundance of predators, and affect temperature and flow." (NAS 2012, p.6-7)

The SWRCB's process for establishing new outflow objectives should be accompanied by full CalSim modeling and evaluation to ensure that outflow objectives do not create unintended consequences upstream by impairing reservoir storage and cold water pool management. While resoring a natural hydrograph would benefit some species, it could adversely affect salmon and steelhead if not approached with care. It is imperative to remember that Winter-Run Chinook, Spring-Run Chinook and steelhead are precluded from accessing their historic spawning habitats by rim dams, and currently rely on carefully controlled reservoir releases for their survival. For these reasons, we continue to recommend that the SWRCB take a year-round approach to evaluating necessary adjustments to the objectives in the Bay-Delta plan and continue to confer with NMFS on relationships between storage, flow and temperature for all the major reservoirs.

In addition, while the NMFS BiOp and RPA are still in effect and provide the means to avoid jeopardizing endangered or threatened anadromous salmonid species, they are not actions designed to recover species to a point where they can be removed from the ESA or meet the doubling goals of the CVPIA. NMFS Final Recovery Plan for Central Valley salmon and steelhead is due to be completed by December 2012, and will address recovery in a complete and thorough fashion. We will transmit that to the SWRCB and staff as soon as it is finished. NMFS remains willing to assist the SWRCB in its efforts to develop criteria for flow, temperature, and other conditions necessary for a Delta ecosystem that can support healthy fish populations.

Please contact Ryan Wulff, of my staff, at (916) 930-3733, or via e-mail at ryan.wulff@noaa.gov if you need additional information.

Sincerely,

Maria Rea
Central Valley Office Supervisor