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JUN 20 2012

Dr. Peter Goodwin
Delta Science Program
Delta Stewardship Council
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Dear Dr. Goodwin:

NOAA's National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (FWS), and the U.S. Bureau of Reclamation (Reclamation), collectively the Federal Agencies, appreciate the Delta Science Program (DSP) and Independent Review Panel's (IRP) assistance in fulfilling a critical component of adaptive management within NMFS' reasonable and prudent alternative (RPA), as well as the commitment of the Secretaries of the Interior and Commerce to undertake an integrated annual review of the NMFS and FWS biological opinions and RPAs.

The IRP provided the DSP with a detailed report on December 9, 2011. On December 15, 2011, NMFS, FWS, and Reclamation sent to the DSP a letter with an initial response pursuant to IRP's report. This letter is provided as a follow-up to the Federal Agencies' December 15, 2011, letter. The Federal Agencies continue to work with the technical teams to review the recommendations and responses from the IRP. We have been implementing those we deem as appropriate and feasible, and we continue to develop lessons learned, incorporate new science, and make appropriate scientifically-justified adjustments to our respective RPAs or their implementation to support water year 2012 real-time decision making.

The enclosure provides FWS' responses to the IRP's comments on RPA actions. NMFS does not have specific and detailed responses to the IRP's comments, as a great deal of staff time has been spent developing and implementing the joint stipulation pursuant to the Consolidated Salmonid Cases, and also staffing up the effort to address the issues remanded to NMFS in the Federal Court's memorandum decision and final judgment. We expect the technical teams to report out on the implementation of those recommendations during the 2012 annual review workshop.

If you have any questions regarding this letter, please contact Garwin Yip (NMFS) at (916) 930-3611, or via e-mail at garwin.yip@noaa.gov; Kim Turner (FWS) at

(916) 930-5604, or via email at kim_s_turner@fws.gov; or Donna Garcia (Reclamation) at (916) 979-0264, or via email at dcgarcia@usbr.gov.

Sincerely,

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Draft Response to the 2011 Independent Review Panel (IRP) on the Implementation of Reasonable and Prudent Alternative (RPA) Actions Affecting the Long-Term Operations of the State and Federal Water Projects

U.S. Fish and Wildlife Service

<date>

Panel Members:

James A. Anderson, University of Washington (chair)
James A. Gore, University of Texas
Ronald T. Kneib, RTK Consulting (Lead Author)
Mark Lorang, University of Montana
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Table of Contents

Introduction

Recommendations brought forward from 2010

Recommendations from 2011

Introduction

On November 8-9, 2011, the Delta Stewardship Council's Science Program convened an expert panel on behalf of the U.S. Fish and Wildlife Service and National Marine Fisheries Service to review the results of implementation of regulatory actions pursuant to their respective biological opinions in water year (WY) 2011. The Science Program facilitated a two-day workshop in Sacramento to consider additional and updated information and new research findings and to discuss issues related to the application of the Reasonable and Prudent Alternative (RPA) actions. The agencies provided both written reports and oral presentations from each of the technical working groups involved in the implementation of the RPA actions. The Independent Review Panel (IRP) provided the Delta Science Program with a detailed report on December 9, 2011. This document constitutes the response of the U.S. Fish and Wildlife Service to the recommendations in the IRP report.

The Service thanks the IRP for its thoughtful review and timely submission. It is our intent to utilize the recommendations to improve both the scientific basis and the overall effectiveness of implementation of our RPA. We look forward to future interactions with the IRP and a continuation of the collaborative process begun in November of 2010. We also thank the Delta Stewardship Council for their efforts at facilitating this process.

Recommendations Carried Forward from 2010

The Service appreciates the 2011 IRP's efforts to track agency progress on addressing the recommendations from previous workshops. In particular, the IRP called out (1) the need to transition from reliance on meeting physical targets to the effects of RPA actions on listed species, (2) the need for development of new models to improve real-time information on flow and temperature for river reaches and behavioral and population-level responses of listed fishes and (3) the need to develop more objective and transferrable standards for recommendations in applying RPA actions. The Service is committed to showing the IRP continual progress toward imlementing these recommendations. This was detailed in the March 9, 2011 letter to the Delta Science Program (http://deltacouncil.ca.gov/sites/default/files/documents/files/workshop_OCAP_2010_review_detailed_response_letter_032111.pdf)
We look forward to continued improvement and feedback from future workshops.

The Service agrees that much more work is needed with regard to linking implementation and outcomes of the RPA actions to species responses, and we appreciate the IRP's recognition that this is a challenging task. We are committed to supporting major research efforts that move us toward this goal. Examples include the Pelagic Organism Decline (POD) studies, the Fall Outflow research program, and other relevant investigations that are employing new scientific techniques and approaches as they become available.

The Service believes that the development of new coupled physical-biological models is an important step in improving the transparency between information flow and management response. Because information is often patchy and the RPA has been implemented only since water year 2009, it may be premature to attempt to use existing monitoring data to draw conclusions on the efficacy of RPA implementation. However, we are hopeful that new research data that are currently in the process of being generated and analyzed will enable clearer insights into species responses in the coming year. The Service will continue to support the development and use of appropriate models, but also recognizes the difficulty of detecting cause-and-effect in the real world (Rose 2000).

Recommendations from 2011

The report presents the findings and opinions of the Independent Review Panel (IRP). With respect to the Service's RPA, the IRP's observations and recommendations include the following:

1. Because WY 2011 was classified as a wet year, most RPA actions that would have constrained water exports under drier conditions were neither triggered nor applied.

   USFWS response: The Service agrees.

2. It is 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.

   USFWS response: The Service agrees that it is too soon to draw statistically valid conclusions regarding the response of delta smelt to RPA implementation. However, as the vast majority of delta smelt live only one year, annual indices of abundance are important. It is worth noting that the Fall Mid-Water Trawl (FMWT) Index for 2011 was 343, a value approaching the 1967-2011 median value of 362 and far exceeding the post-1982 and post-2002 medians of 196 and 35, respectively. This increase exceeded expectations even given that WY 2011 was classified as a wet year. The index in 2006, the most recent prior wet year, was 41, well below the median values for all years and the post-1982 years.

3. Linking RPA actions to vital rates and ultimately to the population dynamics of the listed species remains a key area of concern; every effort should be made to speed the pace of progress in this area.

   USFWS response: Components 1 and 2 of the RPA are intended only to minimize incidental take, and in so doing, improve the survival rate of otherwise healthy individuals. These "take" elements of the RPA are not intended to affect other vital rates such as growth or fecundity *per se*. We agree that linking RPA actions to vital rates and ultimately to population dynamics is of key importance and remain committed to making progress in this area. For instance, the Service is supporting ongoing collaborative efforts by the Interagency Ecological Program (IEP) to examine seasonal growth and condition of delta smelt and to develop a delta smelt life cycle model to help link environmental conditions to vital rates and population responses.

4. The IRP encourages the continued development and future linking of real-time sensor arrays to an informatics expert system that can track variation in physical and ecological data simultaneously as a means of coupling RPA actions with biological response and informing the management of water operations to meet multiple goals.

USFWS response: The creation of a web-based data management system, while not a new idea, is intriguing, and would in addition to providing a single-source information portal, help to increase the transparency of agency decision-making. The Service supports the application of new technology to improve the management of incidental take, particularly if the intent is to manage in a proactive way, as mandated by the RPA. The Service's rationale is that the winter-spring elements of the RPA are intended to protect (1) adult delta smelt that attempt to spawn in the mainstem San Joaquin River from entrainment; (2) their progeny from entrainment; and (3) other larvae from entrainment should they rear in the central Delta. To a large degree, the latter two aspects of our rationale involve protecting fish that are too small to be observed in the fish salvage facilities, but which have historically made up the majority of entrained young-of-year delta smelt (Kimmerer 2008). Thus, the Service believes that if developed, a web-based data management system should be used to manage overall take throughout a season, rather than to attempt to "surgically" manage discrete events, as was attempted by the now-defunct Environmental Water Account program (Brown *et al.* 2009). The Service supports embarking upon a collaborative discussion with our partners regarding potential approaches.

5. If positive effects on listed species are not detectable following a series of "good" water years, the IRP has some concerns about the detectability of effects under less favorable conditions.

   USFWS response: We are uncertain of the intent of this comment. Six of the last ten years have been drier years; further, the increase in the FMWT Index for delta smelt in 2011 suggests that the positive effects of improved habitat conditions are, in fact, detectable.

6. Depressed population levels may affect the quality of the fish monitoring data.

   USFWS response: We agree. There is extensive fisheries science literature on the influence of abundance and environmental factors on fish catchability. As a recent local example, Sommer *et al.* (2011) investigated an inconsistency between the apparent abundance of age-0 striped bass (a POD fish) as indicated by the FMWT and age-1 striped bass collected in other surveys. They concluded that a shift in habitat use from deeper channels to shallower habitats had occurred sometime during the 1980s. While this lateral shift was not sufficient to explain their reduced abundance, it was found to have resulted in their underrepresentation in the FMWT. This is one reason for the IEP's use of multiple monitoring programs and the large number of individual samples taken in surveys like 20mm and FMWT.

7. Recommendations continue to be based upon historical patterns and expert opinion rather than on an objective and transferable template.

   USFWS response: The Service respectfully disagrees with the IRP on this point. Following the recommendations of previous independent review panel processes, we have adopted forecast modeling, turbidity data, data analysis and synthesis and other measures to improve the objectivity of the SWG's recommendations to the Service.

It is important to note that even a totally objective forecasting model would require historically observed information as input, and the interpretation of its outputs would be facilitated by knowledge of historical patterns. The Service is open to suggestions from the IRP concerning means by which we may further improve the objectivity of water operations recommendations.

8. To address these issues, the IRP recommends the adoption of a comprehensive and accessible web-based data management system that uses real-time data and state-of-the-art predictive models for physical variables (e.g., flows, temperatures, substratum transport) and biological responses under changing flow regimes within a spatially-explicit landscape context. An expert system such as this has potential to improve synchronization of water operation decisions with fish behavior and requirements, as well as providing a basis to promote greater objectivity and transparency in the management process that can carry over to future technical teams.

   USFWS response: The Service agrees that such a system could be very useful, particularly in evaluating potential tradeoffs in flow management to benefit species other than smelt. The Service believes that this idea warrants further development.

   The Service believes that the RPA was developed using the best available science regarding water project-related stressors operating throughout the delta smelt's life cycle and it was structured in such a way as to conserve knowledge and expertise about delta smelt's life cycle in the context of water project operations and to facilitate the transfer of that expertise to successive "generations" of technical teams implementing the RPA. It is our intent that appropriate new science be integrated into the RPA. For example, the Service now coordinates with the Metropolitan Water District of Southern California to review modeled turbidity output on a weekly basis. It is important to note that the Smelt Working Group (SWG) comprises experts in delta smelt biology, estuarine ecology, and water operations; the Service intended the RPA as a decision framework for these experts, not as a substitute for their expertise. Further, the SWG includes biologists with many years of experience as well as those who are new to the Delta or to the implementation of the RPA, facilitating a learning environment within which established knowledge is passed and new knowledge introduced. The RPA could be developed into a mathematical "expert system" type model using expertise within the SWG. The Service agrees that should such a model be developed, it could provide a valuable tool for decision making.

9. The IRP continues to recommend and encourage the inclusion of more known or measured responses of the fish populations or life stages targeted by the RPA actions, particularly as multiple years of observations are developed.

   USFWS response: It is our continuing intention to assess the effects of RPA implementation quantitatively whenever possible. The Service recognizes the importance of unambiguous measures of effectiveness and agrees that there will always be room for improvement. Although much of the advice provided in

Appendix 3 appears to be intended for NMFS, the Service agrees that building a regional integrated data management system could be of significant value.

10. In response to a request for feedback on the use of turbidity criteria to implement Action 1, the IRP suggested that they be re-evaluated in light of declining turbidity and the results of the Smelt Turbidity Study which indicate that smelt behavior is linked to tidal phase.

    USFWS response: The Service appreciates the IRP's response to our request for feedback regarding flows and turbidity. As the initial results of the USGS/UCD study indicate, turbidity pulses or "first flush" may not play as large a role in delta smelt movement as originally proposed; this challenges the criteria for the implementation of Action 1 as currently written. Further, it is likely that by the time the criteria for implementing Action 1 are met or exceeded in any given year, turbidity would be widespread in the Delta and no longer a suitable predictor of delta smelt movement. The Service will, as provided in the biological opinion, consider and discuss the development of alternative criteria for the implementation of Action 1. We remain open to continued IRP input on this point.

The Service intends to address the foregoing observations and recommendations both through the SWG and through the internal agency processes that consider the advice of the SWG to make formal determinations for the Water Operations Management Team. We are committed to exploring, both internally and with our management partners, measures that prioritize and address the IRP's recommendations. We would also like to respond to other comments in the IRP report not necessarily linked to specific recommendations.

Assessing Relative Abundance, p. 14 The Service agrees that the assessment of relative abundance is important. The IRP uses the salvage of splittail in 2011 as an example of the consequences of inaccurate assessment of relative abundance; however, the Service believes that this example is not relevant to delta smelt. Splittail and delta smelt exhibit very different life histories. Splittail are largely demersal and dependent upon floodplains for spawning; floodplain area depends upon hydrology and varies widely from year to year. Delta smelt are pelagic and dependent only upon sandy substrates in the Delta for spawning, which the Service does not consider to be a factor limiting delta smelt's population growth rate. In wet years such as 2011, when relatively large areas of floodplain are inundated, biologists do indeed expect that splittail will exhibit very high productivity and that salvage of young-of-the-year will likewise be very high (Sommer *et al.* 2007). Thus the very large numbers of splittail taken at the water export facilities are a reflection of spawning success, not of an inaccurate assessment of abundance. The IEP surveys cited by the IRP are not necessarily the best for assessing the relative abundance of splittail, particularly young-of-the-year that are rearing in flooded areas and which tend to remain near shore (Feyrer *et al.* 2005). Splittail are unlikely to be well-represented in surveys that do not sample the bottom or channel edges. A better survey for monitoring juvenile splittail movement is the Service's beach seine survey.

That said, the Service notes that (1) delta smelt has had a negative population growth rate since the latter 1990s or early 2000s (Thomson *et al.* 2010); (2) at recent levels of abundance, the population is unlikely to exceed its recent historical carrying capacity (Bennett 2005; Maunder and Deriso 2011); and (3) it is therefore unlikely to exhibit "surplus production" that would be compensated for via density-dependence. Kimmerer (2011) recently showed that given these population-dynamic conditions, modest entrainment losses could simultaneously be statistically indiscernable and very detrimental to population growth rate.

Entrainment, Salvage and Take, p. 20 Over the years, we have noticed some confusion with regard to the term "expanded salvage." To clarify, the "salvage" that is reported to the SWG and published on the CVP's web site is based upon a subsample of fish counted at the CVP and SWP fish facilities over a unit of time (usually 30 minutes, repeated every two hours). The salvage that is given in the SWG's meeting notes and annual report already accounts for the expansion of fish counts and thus is more correctly termed "estimated salvage." Salvage is assumed to be a reliable measure of entrainment loss.

Salvage varies with a number of factors, including Delta conditions, fish distribution, reverse flows in the channels leading to the export pumps (Old and Middle River flow, or "OMR"), and relative abundance (Kimmerer 2008; 2011; Grimaldo et al. 2009; Miller 2011). The RPA provides guidance with respect to the first three factors; relative abundance is addressed in the incidental take statement. The purpose of the incidental take statement is to identify the amount of take that is expected to occur, given the project description *and the implementation of the RPA*. It is not intended to identify the number of individuals that *can* be taken, in a manner similar to a credit card limit.

Paragraph 2, page 20 appears to indicate that OMR flows were positive throughout WY 2011, which is not correct. Beginning on January 1, the NMFS RPA required that OMR be no more negative than -5000 cfs; OMR flows did not become positive until March 24, after which seven adult delta smelt were salvaged.

The IRP notes correctly that authorized take is assumed to be a constant fraction of the delta smelt population. The estimated relationship of salvage to total entrainment has a large uncertainty. Pre-screen loss studies have estimated that about 90-100% of entrained delta smelt large enough to be salvaged will not survive long enough to be salvaged at the SWP (Castillo *et al.* in review). The population-level effect of this take is unknown. Historically, the population-level effect of incidental take was assumed to be negligible; however, recent modeling has indicated that population effects may have been significant (Kimmerer 2008; 2011). For this reason, the RPA was designed to prevent the large entrainment events historically seen at the state and federal facilities.

The IRP's example using a hypothetical population size and a constant daily loss rate presents a compelling example of the consequences of low detectability at small population sizes, and illustrates the difficulty of arriving at a sustainable level of take. In any case, it seems unlikely that the effect of take on population size is linear; as the example indicates, it is much more likely that the effect of take is relatively greater at smaller population sizes when density-dependence is not expected to compensate for entrainment mortality later in the life cycle, and

relatively lesser at larger population sizes when density-dependence may provide some compensation. This is another problem that the Service will continue to explore as additional delta smelt life cycle models are developed. The problem of zeros in survey catches leading to increased standard error also applies to the detection of entrained fish. The IEP delta smelt review determined that the CVP and SWP salvage facilities are outdated (IEP 2006). Retrofitting export and salvage operations to reduce pre-screen loss and increase salvage efficiency would be expected to result in improved implementation of the RPA while minimizing the likelihood of compromising effective population size. However, resources for a retrofit are simply not available at this time.

Effective Population Size, p. 21 Over the years, delta smelt population estimates derived by a number of individuals using a variety of methods have been very inconsistent, often by orders of magnitude. This disparity reinforces the need for a population estimate with which there is general agreement. The Service has supported research into delta smelt genetics at the University of California Davis. However, we define effective population size (N_e) as *the number of breeding individuals in a population given the assumption of random mating*. Fisch *et al.* (2011) found N_e to have decreased significantly from 2003 to 2007, the earlier POD years, along with the FMWT index, and increased slightly from 2007 to 2009. The presence of a genetic bottleneck was detected in all years examined, indicating a loss of genetic diversity that has likely occurred over decades of declining abundance. The Service agrees that monitoring N_e is an important indicator of population health and, potentially, of biological response to management measures. We note, however, that some citations in this discussion were not included in the *References* section. We look forward to working with the IRP to correct this unintentional omission.

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