DRAFT

NMFS – Reclamation
Shasta RPA Draft Proposed Amendment Interim Status Conference Call
September 21, 2017

Roll Call for Organizations Represented

Conference Call

1. Reclamation
    a. Jeff Rieker
    b. Federico Barajas
    c. Dave Mooney
2. National Marine Fisheries Service (NMFS)
    a. Maria Rea
    b. Evan Sawyer
    c. Eric Danner
    d. Garwin Yip
    e. Barb Byrne
3. Anchor QEA
4. California Department of Fish and Wildlife (CDFW)
5. City of Redding
6. Contra Costa Water District (CCWD)
7. Department of Water Resources (DWR)
8. Exchange Contractors
9. Friant Water Authority (FWA)
10. Glenn-Colusa Irrigation District (GCID)
11. James Irrigation District
12. Kearns & West
13. MBK Engineers
14. Natomas Mutual Water Company (NMWC)
15. Natural Resources Defense Council (NRDC)
16. North California Water Association (NCWA)
17. Northern California Power Agency (NCPA)
18. Placer County Water Agency (PCWA)
19. Redding Electric Utility
20. Sacramento Municipal Utility District (SMUD)
21. San Juan Water District (SJWD)
22. San Luis and Delta Mendota Water Authority (SLDMWA)
23. Santa Clara Valley Water District (SCVWD)
24. State Water Contractors (SWC)
25. State Water Resources Control Board (SWRCB)
26. Tehama-Colusa Canal Authority (TCCA)
27. U.S. Fish and Wildlife Service (USFWS)
28. Western Area Power Administration (WAPA)
29. Westlands Water District (WWD)

Meeting Objectives, Agenda, and Format (Kearns & West [facilitator])

- The facilitator outlined the objectives of today's workshop, which are to provide updates and receive input on the following topics:
  - Temperature management for the 2017 Sacramento River temperature management season
  - Computer modeling and system-wide analyses of the draft proposed amendment[1] (issued January 19, 2017) to the Reasonable and Prudent Alternative (RPA) of the 2009 NMFS Biological Opinion (BiOp) as they relate to Shasta Reservoir operations
  - Science Work Plan
- The facilitator outlined the format and the ground rules of the meeting.
- This was followed by roll call to identify the organizations represented on the call (see the list of participating organizations on page 1).
- In addition, draft notes from the June 22, 2017, workshop were distributed by email this morning along with the agenda for today's meeting. Please provide any comments on those draft notes to Michelle Havey (mhavey@anchorqea.com) by October 6.

1. Opening Remarks (Reclamation, NMFS)
   - Reclamation opened the meeting by stating that the fourth and final workshop will be rescheduled for November 2017. Reclamation is committed to providing a comprehensive analysis and needs additional time to provide a more refined product. Based on the status of activities, it was prudent to handle today's status update as a phone call. Reclamation noted that this call will be used to update the group on the progress on the Science Work Plan and they appreciate the ongoing interest in this process.
   - NMFS opened the meeting by acknowledging that they are continuing to see low numbers of winter-run Chinook salmon due to the drought, which makes it difficult to make management decisions. NMFS noted they are thankful to both agencies for the work on the joint Science Work Plan and that this call will focus on gathering input to management questions and actionable science.

2. Status Update on the 2017 Sacramento River Temperature Management (Reclamation)
   - Reclamation noted that the meeting format would be to provide brief updates on each of the topics followed by open floor questions and dialogue before moving on to the next topic.
   - Coming into this year, Reclamation was working with NMFS on the Draft Proposed Shasta RPA amendment. Based on the hydrologic conditions this spring, there was a unique opportunity to undertake an operational study this summer to evaluate a temperature target different from the 2009 BiOp, but similar to the proposed RPA amendment. The temperature target evaluated was 53°F daily average water temperature (DAT) at the California Data Exchange Center gaging station upstream of the confluence of Clear Creek on the Sacramento River (CCR). At the June workshop (workshop #3), northern California was just coming off a relatively cool spring, but going into a temperature spike. This has been one of the hottest summers

[1] http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/nmfs_s_draft_proposed_2017_rpa_amendment_-_january_19__2017.pdf

on record for the majority of the Central Valley, including areas around Redding. Charts and graphs from the climate data center confirm this has been an unusually hot summer, but Reclamation has had the benefit of having cold water storage available going into this summer.

- July – There were five temperature swings in July, but water temperature at CCR was held between 52.5°F and 53°F, with only one day exceeding 53.0°F (53.1°F). Reclamation is learning how this relates to the 55.0°F 7-day average of the daily maximum temperatures (7DADM) in the river. For July, the river at CCR stayed well below the 55.0°F 7DADM.
- August – Water temperature decreased compared to July, but was still above average with temperature swings experienced on a weekly basis. There was 1 day that exceeded the 53.0°F DAT (again by only 0.1°F) and 2 days that exceeded a 55.0°F maximum temperature (but not the 7DADM).
- September – Air temperature finally dropped the week of September 18. Shasta operations have not had to access the side gates yet and there is still a large quantity of cold water storage available in the reservoir.

- In summary, this was an optimal summer for being able to manage temperatures due to the unusual hydrology this year. Temperature management has been successful at meeting the intended targets and the operators in Reclamation's Central Valley Office have done a great job managing temperature on a daily basis.

Meeting attendees provided the following questions and feedback:

- There were no questions on this update.

3. Status Update on Computer Modeling and Analysis of the Draft Proposed RPA Amendment (Reclamation)
   - The majority of the last workshop was spent presenting the temperature modeling results. The major effort this year was to analyze the elements of the draft proposed RPA and to fully understand the impacts of the draft proposed RPA amendment. Preliminary results were presented in the last workshop from the CalSim model evaluating the operation impacts of managing to various metrics, including the following:
     - Minimum fall storage targets
     - Minimum spring storage targets
     - Release caps that could be placed on spring releases at Keswick
   - The initial results showed potentially significant impacts to the Central Valley based on those operational targets. Reclamation has been working on CalSim refinements to the model to reflect real-world scenarios (e.g., how the system is currently operated and how the system would be operated under the proposed metrics). The modeling effort has continued to focus on temperature compliance as well as biological objectives. Reclamation is comfortable with how the CalSim model is working now and that effort is nearly complete.
   - A sensitivity analysis has been completed on the concept of how to operate in the critical years with implementation of D-1641 in the Delta, and also with changes to D-1641 (through temporary urgency change petitions, as were requested and granted in 2014 and 2015). This analysis is also coming to a conclusion. Overall, there is a

difference when managing in a drought year, but the ballpark impact has not changed significantly from what was reported in the June 22 workshop (workshop #3).

- The next step in the process was to develop a linkage between the CalSim and HEC-5Q temperature models to the biological mortality models, and to see if biological objectives can be met. Extensive work has gone into developing the infrastructure for these model linkages to allow for iterative model runs. The infrastructure is complete and the models are producing results, but they are still being refined to make sure those results are reasonable. The results will be presented in the next workshop.

Meeting attendees provided the following questions and feedback:

- Question: Are any of the updated modeling results available?
    - Reclamation response: The results are not quite ready for distribution as they still need to be checked for quality assurance and quality control. The results will be provided at the November workshop. If there are specific questions on the model, send those directly to Jeff Rieker and he will distribute to the modeling team.

4. Status Update on the Science Work Plan: Framework (Reclamation)
    - Reclamation started off by stating that the purpose of the Science Work Plan is to complete the following objectives:
        - Inform adaptive management related to NMFS RPA Action Suite 1.2
        - Identify monitoring, modeling, analysis, and synthesis needs to reduce uncertainty on how actions may achieve fish and water management goals
        - Coordinate activities among agencies, stakeholders, and other interested parties
    - The purpose of today's call is to solicit feedback on the proposed framework of the plan and identify specific management questions to include in the plan.
    - Proposed Science Work Plan outline:
        - Purpose (stated above)
        - Background – A summary of work completed to date in getting to the RPA and where we are today
        - Conceptual Models and Frameworks – A common basis for understanding how different parties see the issues and understanding their perspectives
        - Management Questions
        - Ongoing Activities
        - Technical Approach
            - Related Projects and Programs – Are there opportunities to learn from and incorporate information from those projects and programs?
            - Coordination Forums – How to work with stakeholders to gather and incorporate feedback?
            - Data Access and Availability – How do we make data available and work transparently?
            - Methods and Study Design
        - Activities – Identify activities to address uncertainties

  - References
- Email Dave or Maria with any questions or input and feedback for the Science Work Plan

Meeting attendees provided the following questions and feedback:

- Question: Is there going to be a discussion of the consequences of proposed changes to water users or power generators?
  - Reclamation response: That will be addressed in the Proposed Operations Plan; the Science Work Plan is focused on the science. Results from the Science Work Plan will be taken and translated into operation actions, which will be used to assess the consequences of those actions.
- Question: How will the information be synthesized, reported, and then used to inform adaptive management?
  - Reclamation response: We will be sure the Science Work Plan includes a pathway for synthesis, reporting, and closing the adaptive management loop.
- Question: Is there going to be a discussion on the methods to measure success? The goal is to improve habitat and the environment for fish. How will we know if the measures are working or beneficial toward meeting that goal?
  - Reclamation response: That level of detail is beyond the scope of the Science Work Plan, but would be included in the Proposed Operations Plan.
  - Follow-up Question: It seems that the Science Work Plan is narrowly focused. There should be some discussion in the Science Work Plan to introduce the topic of how to measure success, which will provide supporting arguments that could be referenced when developing the metrics.
  - NMFS Response: We appreciate the comment and agree that we need to include metrics to evaluate species viability. As part of this proposal, NMFS did propose a set of new objectives (e.g., temperature dependent mortality). The purpose of the Science Work Plan is to hone in on whether those are the right metrics.

5. Status Update on the Science Work Plan: Management Questions (NMFS)
   - NMFS acknowledged a need to appropriately separate science and management so that relevant research informs management decisions. Management questions help drive the science needed to inform management. We need to think about what it is that we are trying to manage. NMFS is managing for a species, while Reclamation is managing for operations. With that in mind, NMFS has identified the following bins for management questions:
     - Shasta management and operations (e.g., cold water storage)
     - Forecasting (e.g., the ability to predict how conditions will be several months in advance, how fall storage effects the spring water pool, and predicting lake stratification)
     - Species viability and variability (e.g., make sure management goals are realistic and lead to viability characteristics)

  - Climate (e.g., understand and recognize we are in changing times, including hot summer temperatures)
  - Interactions between multiple stressors (e.g., temperature with pathogens and predation)
  - Structural modifications or adjustments (e.g., various attempts to work on temperature control devices)
- NMFS is hoping to get input today and following today's meeting on other management questions or bins to include in the Science Work Plan. The questions should relate to something you're trying to manipulate and manage in the system, and specific enough to spring-run and winter-run Chinook salmon to increase viability of the species. The science should help inform the conceptual models.
- Reclamation confirmed that there are no constraints on the types of questions that can being considered. What types of actions do we want to take? Why do we want to take them? And can we trace the action back to a fish or water supply need?

Meeting attendees provided the following questions and feedback:

- Question: What are the management objectives (e.g., numbers in the river)? What are the triggers and thresholds to determine if they've been met?
  - NMFS Response: This goes back to our proposal and addressing the question is not a simple or trivial task. Reclamation and NMFS will present these objectives in the November workshop.
- Comment: When you talk about management questions, the focus is on temperature in the egg mortality model. But it was concluded that the mechanism for mortality is dissolved oxygen (DO). I recommend there be a focus on DO metrics since that is really what is causing mortality.
  - NMFS Response: That is not entirely accurate. DO in the redd is the mechanism for mortality, not ambient DO in the river. At very low flow, there is a boundary effect around the egg. As the temperature rises with very low flow, oxygen cannot be supplied to the egg.
- Follow-up Comment: We have never seen a linkage between desired temperature and DO in redds. When CDFW did a DO study in 2014, DO in redds was not a limiting factor.
  - NMFS Response: To capture that linkage, the ideal *in situ* measurement would be a series of DO probes within the redds, specifically the egg pockets. What is likely happening is that as water enters the front of the egg pocket, the first eggs are using up available oxygen and there is a depletion of DO such that the eggs at the back of the egg pockets are experiencing oxygen deficiencies. NMFS will be conducting a laboratory study at the SWFSC to address this very question.
- Question: Is NMFS only concerned with very low flows and high temperature conditions?
  - NMFS Response: Yes, very low flow within a redd is the condition we are concerned with. However, increasing flow in the river will not fix this; low

flow and high temperature within the redd, not within the river, are causing the mortality.
    - NMFS Response: NMFS has a management question associated with this issue and is building the science to address this question. If anyone has a hypothesis we should test, that is what we are interested in hearing from the group.
- Comment: The focus is on water temperature and egg development. However, there is a trade-off with temperature and growth; lower temperatures and slow growth results in small emerging fry, compared with higher temperatures that increase metabolism and result in larger emerging fish with improved survival. Sacrificing eggs for increased growth and fitness at Red Bluff Diversion Dam (RBDD) may be beneficial. I would like to see population metrics at RBDD because there may be fewer individuals, but they may be larger and more fit.
    - NMFS Response: The timing of exposure to higher water temperatures could be important. Eggs may be less susceptible to temperature and DO when they are first deposited, and then more susceptible later in development.
- NMFS reiterated that they are interested in getting feedback after the call as well. There will be a report out on the management questions at the next workshop.
- Send any feedback or input to Josh Israel (JAIsrael@usbr.gov) or Garwin Yip (Garwin.yip@noaa.gov) by October 6.
- The plan is to assemble input in September and early October and develop the draft Science Work Plan together by the end of the year. The draft will then be circulated for review, but we expect to be learning and adapting, so this will be a living document that will track changes through time.
- Reclamation and NMFS appreciate everyone taking the time to participate in today's call and offered to meet with individuals or groups that would like to provide feedback.

6. Concluding Remarks
    - If anyone has suggested edits to the Notes and Responses to Questions from the June 22, 2017 workshop, let Michelle Havey (mhavey@anchorqea.com) know by October 6.
    - Additionally, let Michelle Havey know if you would like to be added to the email distribution list.
    - Future Workshops
        - November (Date TBD) – This will focus on results of the continued modeling effort to inform the path the amendment process will take.