ROConLTO Shasta Temperature follow up meetings – March 12, 2019

NMFS CCVO – 650 Capitol Mall, Suite 5-100, Delta Conference Room

9am-10am – Informal check-in on Shasta Temperature clarifications

Participants:

** if via phone*

NOAA SWFSC: Miles Daniels*, Eric Danner*
NMFS CCVO: Garwin Yip, Evan Sawyer, Sarah Gallagher, Barb Byrne
Reclamation: Katrina Harrison, Russ Callejo
DOI: Lori Caramanian

Summary:

- Revisited discussion from 3/5 "Shasta seasonal management and allocations logic" meeting
    - Reclamation says they account for all regulatory requirements and the allocation is based on what's left yet NMFS still not clear (and Reclamation hasn't articulated) *how* Reclamation accounts for summer temperature management during the forecast process.
    - Asked if Reclamation tried to meet Tier 1 conditions in all years, Reclamation said no, since are other demands on Shasta.
    - Reclamation mentioned that the discussion on 3/5/19 was guided by a spreadsheet the modelers use to generate the forecast; when asked if that spreadsheet could be shared, Reclamation said "no".
- Discussed how Tiers 2 and 3 were expected to be implemented
    - Reclamation summarized that, in general, they tried to provide 53.5 degrees F during at least the "critical period", then spent the water to improve the "shoulders" outside of the critical period.
    - When the least cold water pool was available, no days at 53.5 degree F were provided.
    - Reclamation noted that they would welcome information from NMFS about how to implement temperature management in Tier 2 and Tier 3 years.
    - SWFSC has funding to run some experiments to test the temperature-DO-related mechanism for egg mortality and preliminary results may be available by May 2020 that could inform temperature management for the WY 2020 temperature management season.
- Reclamation noted that in addition to the Marin and Anderson egg-mortality models, SALMOD, IOS, and the Reclamation Mortality Model each use a distinct egg-mortality model.

Decisions and action items:

- None specific to BA clarification or effect analysis; implementation of Tiers 2 and 3 still a bit unclear.

1-3pm – Meeting to discuss HEC-5Q modeling results provided in BA, and follow-up modeling

Participants:
** if via phone*
NOAA SWFSC: Miles Daniels*, Eric Danner*
NMFS CCVO: Howard Brown, Garwin Yip, Evan Sawyer, Sarah Gallagher, Barb Byrne
Reclamation: Katrina Harrison, Josh Israel, Peggy Manza*, Luke Davis*, Mike Wright
CDFW: Ken Kundargi*, Duane Linander*
ICF: Gregg Ellis*, Sophie Unger*
DWR: Marianne Kirkland*
Jacobs: Rob Leaf, Steve Micko

Summary:

Modelers from Reclamation (Mike Wright) and Jacobs (Rob Leaf and Steve Micko) provided an overview (see slides in Attachment 1) of the modeling approach used in the BA (the "82-year simulation"), and some follow-up modeling for some sample years.

In all modeling scenarios (for BA and initial iteration of follow-up approaches)
The key inputs into the HEC 5Q model are the Shasta releases (from the CALSIM results) and the target temperature for Shasta releases. The target temperature for Shasta releases are developed based on the targeted regulatory temperature and compliance location (e.g. 53.5 degrees F at CCR gage) and some assumptions about the warming expected between Shasta and the temperature compliance location. For example, if targeting 53.5 degrees F at the CCR gage, and 2 degrees of warming is expected, then the target temperature for Shasta releases would be 51.5 degrees F. The HEC 5Q model then models TCD operations to attempt to meet targeted temperatures for Shasta releases.

While the HEC 5Q model has 6 hour resolution, the CALSIM inputs are monthly flows and storage conditions. Average monthly flows were assumed throughout the month (with the exception of some smoothing applied in last few days of one month and the first few days of another to avoid discontinuous flows).

Modeling in BA:
In all scenarios: End-of-April storage used to decide the temperature plan for the year.

COS scenario: Used the "SRTTG" approach, which is described in detail in the Final EIS for the previous CVP/SWP ops consultation (see links in Action Items, at end of summary). Temperature target was 56 degrees F at a single temperature compliance location (location dependent on end-of-April storage).

PA scenario: Modelers developed a rough temperature management approach to capture the tiered management strategy proposed in the BA. Temperature target was 53.5 degrees F at CCR gage during July and August if possible, shoulder periods were not to exceed 56 degrees F (overall temperature profile dependent on end-of-April storage).

Follow-up modeling:
Modelers pulled out 5 example years to look at a more detailed, iterative, daily-resolution analysis that better mimics what might occur in real-time under COS and PA scenarios – have completed analysis for two years (1930 as a Tier 2 example; 1944 as a Tier 3 example). For example, after the initial run using the same approach as in the BA modeling, the modelers would look at exceedances and adjust the temperature targets for Shasta releases to avoid exceedences whenever possible. This might be comparable to operators releasing more flow and/or colder water in anticipation of an especially hot day. Modelers also looked at output and if have cold water left over (or run out), might iterate analysis again to be more aggressive (or less aggressive) early in the season.

Take aways:

- In general, the follow-up modeling shows that the direction of change (but not necessarily the magnitude of change) between COS and PA temperatures at the CCR gage is consistent with the modeling presented in the BA.
- Jacobs expects to continue with additional follow-up modeling for inclusion in the EIS for the current ROConLTO consultation.

Decisions and action items:

1. Reclamation to share presentation. *(Done – see Attachment 1)*
2. Reclamation to share links to the description of the "SRTTG approach" (used in the COS scenario HEC 5Q modeling) provided in the Final EIS on the Coordinated Long-Term Operation of the Central Valley Project and State Water Project. *(Done – see below)*

    "This is the first section of Appendix 6B.
    https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=23710
    This second section contains 6B.C.11, which describes the temperature selection spreadsheet for the SRTTG (Current Operations) modeling.
    https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=23711

Attachment 1:

Slides presented at 3/12/19, 1-3pm,
Shasta Temperature Meeting

ROC on LTO:
Shasta Temperature Management

3/12/19

Introduction

- The ROC on LTO Proposed Action includes new temperature management strategy
- Along with a change in Shasta operations (storage and flow), temperature management strategy affects timing, location, and magnitude of temperature change on the upper Sacramento River

Objective

- Present modeling approach used for Biological Assessment
  - Current Operations
  - Proposed Action
- Describe follow-up work

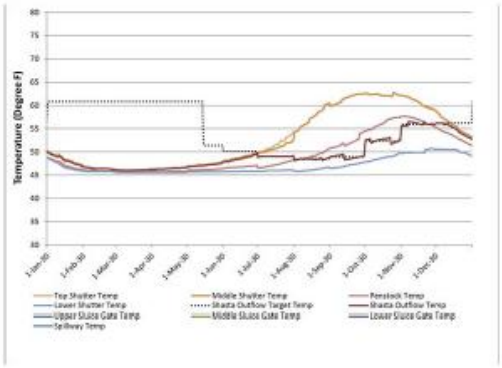
Modeling Approach

- 82-year approach for SRTTG
  - Same as 2015 LTO (Remand) and California WaterFix
- 82-year approach for PA
  - Temperature management objective discussed in Section 4.9.1.3 of Biological Assessment

Example Shutter Operations

- TCD flows and Sacramento River temperatures

- TCD temperatures



Follow-up

- Daily analysis of 5 select years
  - Tier 1: 1954 – Large volume of cold water pool (CWP) and hot September
  - Tier 2: 1930 – Adequate CWP to meet target
  - Tier 3: 1944, 1947, 1964
- Re-ran with daily temperature management for SRTTG and PA for COS and PA, respectively

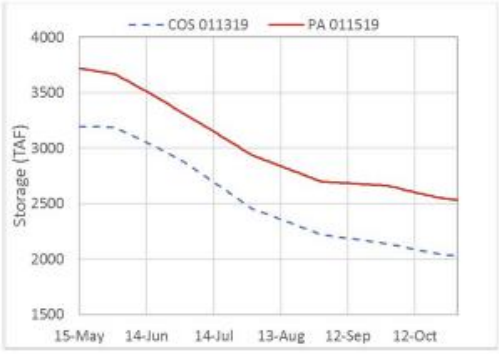
1930 – Flow and Storage

1930 – Temperature Results

- 82-year simulation results (presented in BA)

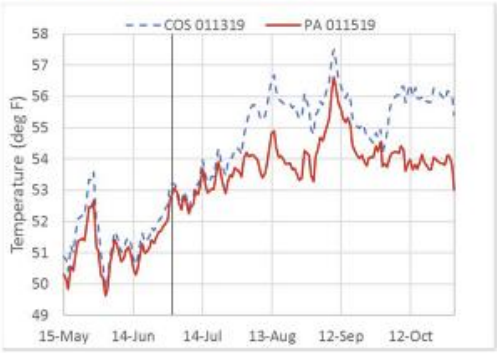
- Follow-up simulation with modified temperature strategy at a daily time-step

1944 – Flow and Storage

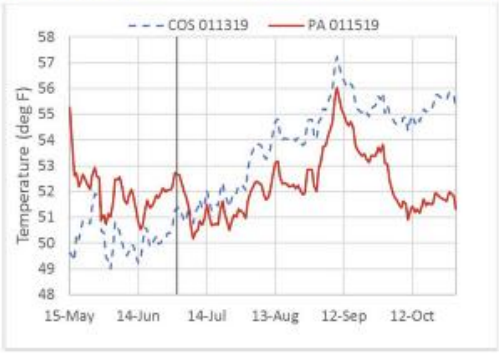


1944 – Temperature Results

- 82-year simulation results (presented in BA)



- Follow-up simulation with modified temperature strategy at a daily time-step



Take aways

- For most of the years selected, direction of change between COS and PA temperatures at Sacramento River below Clear Creek are consistent with results presented in BA
- However, magnitude of change between COS and PA temperatures varies between the approaches

Next Steps

- Propose 82-year runs with daily temperature management
- Investigate model version