

**Sacramento River Temperature Task Group (SRTTG) Meeting**  
**April 21, 2022, | 1:00 PM – 2:45 PM**  
**Meeting Summary**

***Participants***

Bill Poytress, USFWS  
Chris Laskodi, Yurok Tribe  
Claudia Bucheli, SWRCB  
Crystal Rigby, CDFW  
Craig Williams, SWRCB  
Doug Killam, CDFW  
Donald Bader, Reclamation  
Diane Riddle, SWRCB  
Erica Meyers, CDFW  
Eric Danner, SWFSC  
Gabe Singer, CDFW  
James Gilbert, SWFSC  
James Earley, USFWS  
Jeffrey Onsted, DWR  
Jeff Laird, SWRCB  
Jo Anna Beck, Reclamation  
John Ford, DWR  
John Hannon, Reclamation  
Jonathan Williams, CDFW  
Justin Ly, NMFS  
Kevin Reece, DWR  
Kimberly Holley, CDFW

Kristin White, Reclamation  
Kristal Davis-Fadtke, CDFW  
Lauren McNabb, CDFW  
Lee Bergfeld, SRSC  
Lenny Grimaldo, DWR  
Liz Kiteck, Reclamation  
Mary Suppiger, Reclamation  
Matt Holland, SWRCB  
Miles Daniels, SWFSC  
Michael Macon, SWRCB  
Michael Wright, Reclamation  
Mike Deas, SRSC  
Mike Prowatzke, WAPA  
Stephen Maurano, NMFS  
Suzanne Manugian, Reclamation  
Taylor Lipscomb, SWRCB  
Thad Bettner, SRSC  
Tim Hayden, Yurok Tribe  
Tom Patton, Reclamation  
Vanessa Kollmar, CDFW

***Facilitation Team***

Adam Fullerton, Kearns & West  
Julie Leimbach, Kearns & West

**Key Discussion Topics with  
Summary of Recommendations and Outcomes**

**Action Items:**

1. Reclamation will find the citation and/or justification for the Tcrit number used by Reclamation in the model assumptions and determine if using the SWFSC Tcrit number would be appropriate to improve consistency between the models.
2. SWFSC will add a note on model run slides clarifying that 2021 redd distribution is being used.
3. SWRCB will report back to the Shasta Planning Group (SPG):
  - a. Uncertainty of using aggregated or bookend redd distribution years.
  - b. Suggest that the 2021 redd distribution is the best reference for 2022 based on the similarly dry hydrologic conditions.
  - c. SPG requested a point of comparison based on different redd distributions, so SRTTG suggests as a rule of thumb, adding between 10-20% to the aforementioned TDM forecast to take into account the possibility of the redds being located further downstream and therefore subject to higher mortality rates in warmer water. This is based on the range of TDM forecasts that resulted when Reclamation and SWFSC modelled the 2016-2021 redd

distributions. SRTTG modelled the 2016-2021 redd distributions to explore model sensitivity, but suggested using a heuristic to avoid over interpretation of model results which are based on uncertain aerial redd observations under drastically wetter hydrology (e.g. 2017 and 2019).

4. NMFS will submit an email with NMFS' technical input on the Draft TMP. (Completed)

### **Prior Action Items**

Julie Leimbach, Kearns & West reviewed action items from the previous meeting on April 14, 2022:

1. KW to circulate the populated modeling assumptions table to SRTTG. Reclamation and SWFSC to review and confirm information. SRSC to populate their column.
  - KW will update the table with the information sent by SRSC.
2. SWFSC to confirm where any of their current assumptions vary from those used in March modeling.
  - Complete.
3. Reclamation to share full modeling runs with SRTTG. SWFSC to graph Reclamation results alongside their own in their regular format for easier comparison.
  - Complete.
4. Reclamation and SWRCB create profile results in a graphical format.
  - Complete.
5. Suzanne will relay back to BDO that the SRTTG supports using the 2021 redd distribution as the distribution input for the TDM modeling.
  - Complete.

### **1. Model Assumptions**

Miles Daniels, SWFSC, reviewed the SWFSC model parameters and assumptions outlined in the Modelling Assumptions Table. See table for all details. Some key points include:

- The model uses 2015 as a base year for meteorology; however other years are run for comparison. The Global Forecast System (GFS) is used for short-term meteorology; it has a max time period of ten days. Meteorology is consistent except for short-term forecasts.
- The model is updated with the most recent available vertical profile.

Mike Deas, SRSC, discussed the SRSC model assumptions and parameters. Key points included:

- Temperature targets in the model may be less accurate for 2022 since flows this year are very different from historical comparisons.
- The model uses Shasta and Keswick Reservoir models, not all reservoir and river models.

### **Discussion of Model Assumptions**

*General discussion items included:*

- The Modeling Assumptions Table will reflect the desired consistent assumptions to apply to model runs throughout the season. Current model runs deviated somewhat from the intended assumptions.

- The group discussed the possibility of making some of the different assumptions the same for increased comparability between the model results. These areas included redd distribution assumptions and Tcrit.
- The reservoir and river models do not integrate observed temperatures, however observed temperatures are included in the biological analysis.
- NMFS suggested that the SRTTG clarify the assumptions and management implications of using stage dependent and stage independent mortality at a future meeting.

#### *Redd Distribution Inputs*

The group discussed the redd distribution years used in the models and updated the Modeling Assumptions Table to reflect their intended proposed assumptions and assumptions for this model run.

- The modelers intended to use the 2016 – 2021 individual redd distribution years for future model runs. In some cases, their current runs did not follow this assumption completely.
  - a. SWFSC did not have time to run the model with the 2020 redd distribution, there was not an intentional difference in redd distribution years.
  - b. Reclamation ran 2016 – 2021.
  - c. It was noted that the data for 2016 was influenced by water turbidity and maybe should be excluded.
- The group discussed the benefits and disadvantages of options for redd distribution inputs in the model including: 1) individual, 2) aggregate, 3) bookend comparison years, or 4) post-processing adjustment to account for uncertainty.
  - a. Individual Years
    - Benefits – Individual year of 2021 conditions could be specifically compared to 2022.
    - Disadvantages – Using one year may present an optimistic picture that is not achieved if the spatial redd distribution is further downstream in 2022.
  - b. Aggregate of Years
    - Benefits – Includes conditions of multiple years.
    - Disadvantages – Not the most relevant guide to use for 2022. Aggregate of years are an average of years and lose the specificity of conditions in each year that could apply to 2022.
  - c. Bookend comparison years
    - Benefits – Provides a high and low potential TDM we might expect in 2022.
    - Disadvantages - Not the most relevant guide to use for 2022.
      - If bookends were to be used, a suggestion was made for 2019 for reds and 2017 for carcasses.
  - d. Post-processing adjustment
    - Benefits – Can add 10-20% TDM to the prediction based on 2021 reds to account for reds distributed further downstream since 2016, especially during 2019.
    - Disadvantages - There is a concern people often only look at only the number and not the text or the adjustment.
- The group discussed the need to clearly document the rationale for the redd distribution assumptions to help decision makers understand the issues and potential impacts on TDM.
- Action - SWRCB will report back to the Shasta Planning Group:
  - a. Uncertainty of using aggregated or bookend redd distribution years.
  - b. Suggest that the 2021 redd distribution is the best reference for 2022 based on the similarly dry hydrologic conditions.

- c. SPG requested a point of comparison based on different redd distributions, so SRTTG suggests as a rule of thumb, adding between 10-20% to the aforementioned TDM forecast to take into account the possibility of the redds being located further downstream and therefore subject to higher mortality rates in warmer water. This is based on the range of TDM forecasts that resulted when Reclamation and SWFSC modelled the 2016-2021 redd distributions. SRTTG modelled the 2016-2021 redd distributions to explore model sensitivity, but suggested using a heuristic to avoid over interpretation of model results which are based on uncertain aerial redd observations under drastically wetter hydrology (e.g. 2017 and 2019). *Tcrit*

The group also discussed the different Tcrit numbers between the Reclamation model and the SWFSC model.

- The SWFSC and Reclamation TDM Tcrit assumptions are slightly different.
  - a. SWFSC Tcrit source: Martin, et al, as the best fit parameter.
  - b. Reclamation Tcrit source: recently adjusted, Reclamation will look into the citation and consider changing it to match SWFSC Tcrit number.
- It is unclear how the difference in Tcrit will impact TDM. The effect may be minimal or more substantial depending on the redd distribution.
- Action: Reclamation will review the citation for the Tcrit being used and determine if using the SWFSC Tcrit is acceptable.

## 2. Technical Input on Draft TMP

### Existing Conditions

Tom Patton, Reclamation, briefly discussed the current conditions.

- There has not been much change in the profiles since the last meeting.
- A new profile will be available Wednesday April 27.
- The actual conditions are similar to model predictions.

### Comparative Model Results

Reclamation, SWFSC, and SRSC modelers all ran two scenarios through their models and reported the results for SRTTG consideration.

Please refer to the packet for the model runs and assumptions. It is important to note that Reclamation and SWFSC named these Scenario 1 and 2 but in opposite order

The scenarios included:

- 54.5°F temperature target
- 56°F temperature target

The modelers described the following discrepancies between their model scenarios as follows

- Location of Temperature Target
  - a. SRSC used Clear Creek Gauge
  - b. SWFSC and Reclamation used SAC gauge
- Scenario Labels – please note that the modelers labeled the scenarios in different ways. Please refer to the scenarios as 56 °F Scenario and 54.5°F Scenario.

- a. Reclamation Scenario 1 – 56 and Scenario 2 - 54.5
- b. SWFSC Scenario 1 - 54.5 and Scenario 2 – 56
- c. SRSC – did not number scenarios

Miles Daniels, SWFSC, reviewed the SWFSC model results (see meeting packet). Key points include:

- Graphs on the left side include Reclamation and SWFSC data comparison
- TDM estimates
  - a. 54.5°F scenario - 42%
  - b. 56°F scenario - 66%
- SWFSC used the Reclamation 56°F scenario model run in both of the SWFSC model output comparisons included in the meeting packet.
- Temperature Control
  - a. It is difficult to determine when Reclamation lose temperature control.
  - b. Losing temperature control and thresholds could be better defined to inform discussion. Options for definition could include: when Reclamation can no longer operate the TCD or 1-2 weeks after loss of Reclamation’s ability to operate the TCD in which time the effects of the TCD are still in effect.
- Since it is such a low flow year, downstream temperature will be more dependent on meteorology.
- A comparison of stage dependent and stage independent TDM across individual and aggregate redd distribution years, and those same years with 1°F decrease in temperature shows that decreased temperature has a much larger impact on TDM than does redd distribution or stage dependent and stage independent models.
- Action - SWFSC will add a note that these results are using the 2021 redd distribution

Mike Deas, SRSC, reviewed model outputs, the graphs and details will be added to the meeting packet. Key points include:

- Temperature Control
  - a. The model shows a loss of temperature control around September 10.
  - b. This is similar to Reclamation and SWFSC models.

## Discussion

- The Reclamation model assumes that the middle gate will no longer be usable two weeks before the SWFSC model assumes the same. This results in the Reclamation model showing cooler temperatures earlier in the summer than the SWFSC model. However, the models are still close.
- In the fall, switching to the side gates reduces the ability to control temperature of flows out of Shasta Reservoir. In past years, the loss of temperature control did not immediately and significantly warm the Shasta Reservoir releases. It might take 1-2 weeks from switching to side gates and loss of temperature control for the Shasta Reservoir releases to warm significantly. However, this year due to the drought, Shasta Reservoir flow releases are going to be very low compared to other past years. With the lower magnitude flow releases, the water may warm more quickly than in past years. Therefore, we face greater uncertainty around the predicted timing of significant temperature warming of instream flow releases from Shasta Reservoir.
- The inclusion of meteorology in the SWFSC model causes some differences in the model results.
- The SRSC model uses Clear Creek gauge, SWFSC and Reclamation use SAC gauge, this should not create too big a difference, the results should still be roughly comparable. However, this year the water is so low it is unclear how downstream temperatures will be impacted.

## Technical Input

Reclamation requested technical input from SRTTG to inform the Temperature Management Plan. This technical input will inform policy recommendations by the Shasta Planning Group. Individual SRTTG members provided the following technical input for the Temperature Management Plan:

- NMFS supported managing to the 54.5°F temperature target as well as the additional conditions outlined below with the indicated caveats regarding chillers for the hatchery. NMFS emailed the following technical input following the meeting:
  - a. NMFS recommends a temperature target of 54.5°F at the Sacramento River Upstream of Highway 44 (SAC gauge) for 16 weeks centered on 8/2/22 and a shoulder temperature of 57.9°F (Scenario 1 of 4/20/22 SWFSC modeling).
  - b. The shoulder temperature target (57.9°F) will need to be carefully monitored and managed in real-time. The Spring target may need to be adjusted if substantial pre-spawn mortality or other fisheries impacts are observed.
  - c. This temperature recommendation is also predicated on the assumption that adequate chiller infrastructure will be installed at Livingston Stone National Fish Hatchery for 2022. If Reclamation does not anticipate that mitigation measure being implemented, NMFS would request that they notify the SRTTG at the earliest possible opportunity so alternatives for mitigating Fall maximum temperatures can be considered.
  - d. Full side gate operations often are required a week or two after the date the first side gate is opened on the Temperature Control Device. The draft TMP predicts a substantially longer duration (47 days, between July 16 and September 1) than in most years. Likewise, in river thermodynamics are different NMFS recommends careful monitoring and weekly SRTTG meetings throughout the temperature management season.
  - e. We are not aware of any plans for Reclamation to implement a spring power bypass action, but should such an action be considered, we recommend keeping water temperatures below 58 °F to reduce the risk of prespawning mortality.
- USFWS supported managing to the 54.5°F temperature target at the SAC gauge.
  - a. Concurred with the comments from NMFS
  - b. Emphasized the need to avoid going above 60°F in the early season.
- CDFW supported managing to the 54.5°F temperature target at the SAC gauge.
  - a. Concurred with NMFS and clarified that the 54.5°F target should be at the SAC gauge not Clear Creek gauge.
  - b. This is specifically a technical position from CDFW not a policy position.
- SWRCB supported managing to the 54.5°F temperature target at the SAC gauge.
  - a. Concurred with the NMFS comments.

Reclamation summarized the concurring opinions that the target at the SAC gauge should be to stay below 58°F until June 7, and then maintain 54.5°F for the remainder of the season.

Next Meeting: Thursday, April 28, 2022.