



Sacramento River Temperature Task Group Notes

May 18, 2023

Members Attending

- USBR: Derek Rupert, Elizabeth Kiteck, Mary Suppiger, Tom Patton
- USFWS: Craig Fleming, James Earley, Matt Brown
- CDFW: Crystal Rigby, Doug Killam, Kimberley Holley, Tracy Grimes
- NMFS: Garwin Yip, Seth Naman, Stephen Maurano
- SWFSC: James Gilbert
- DWR: Mike Ford, Kevin Reece
- SWRCB: Craig Williams, Diane Riddle, Jeff Laird, Matt Holland
- SRSC: Anne Williams, Mike Deas, Thad Bettner
- Yurok Tribe: Kyle De Juilio
- Hoopa Tribe:

Topics/Actions

- Modelers: Explore doing more fall-run TDM modeling to have the comparison of fall and winter-run TDM.
- SWFSC: Conduct TDM modeling based on Reclamation's modeling of downstream temperature control points.
- All: provide drafts on TDM, to initiate final Temperature Management Plan.

Welcome, Agenda Review, and Purpose

Adam Fullerton, Kearns and West welcomed all participants.

Purpose and Objective

The purpose of the SRTTG is to “share operational information monthly and improve technical dialogue on the implementation of the temperature management plan.” Reclamation provides “a draft temperature management plan to the SRTTG in April for its review and comment, consistent with WRO 90-5.”

Hydrology, Operations, Forecasts, and Temperature Management

Reclamation presented the hydrology, operations, and temperature management updates.

Northern Sierra Precipitation:

- Sac River- 8 station Precipitation Index is at 62.7 inches of precipitation, 125% of average for the year, similar to what was seen in the 2019 water year.
- Not much has changed since April's update.
- Little precipitation in the forecast except for some mountain showers further south, but nothing in the Northern part of the state.

Snowplots:

- The snow water content as of May 17th compared to the percent of April 1st average: Northern Sierras are at 125% of April 1st average, which is 279% of average for this date.
- The Central Sierras are at 158% of normal of the April 1st average. It is at 309% for this time of year.
- Southern Sierras is at the same max levels as in 1983, at 207% of the April 1st average. 447% average for this date. Huge amount of snowpack is still present in the Southern Sierra. Snowpack is beginning to melt due to the heat.
- Inflow to Shasta and Trinity has been steady. High inflows at Whiskeytown for this time of year but have been slowly receding.

Releases and Storage:

- Shasta:
 - At Keswick releasing 13,000 cfs, higher than the average. Showing a wetter year than average.
 - Storage at Shasta is almost full. Will remain at this level for most of May and most of June, at which point the reservoir will slowly come down until the latter half of the summer when we will begin preparations for flood control operations for next winter.
- Trinity River Division:
 - As of May 16th, Reclamation is releasing less than 2,000 cfs below Lewiston and will be slowly decreasing cfs output. ROD flows will be brought down to 450 minimum flows for the summer in late June.
 - The Trinity Reservoir is still picking up inflow at 1 MAF.
 - Trinity Reservoir is expected to fill a little higher at 1.1 MAF.
- Folsom & New Melones:
 - Increasing with the snow run off in the Central Sierras.

Water Temperatures:

- Shasta:
 - TCD- all upper gates are open; the release is slowly warming up.
 - Shasta is seeing more of a release from the upper outlet gates due to power issues with negative pricing.
 - The warmer weather is increasing the demand for power for air conditioning. This means that there is sufficient demand for power from Shasta so going forward all releases will likely go through the powerhouse.
 - Will monitor Shasta inflow and will consider making some cuts in releases next week.
- Keswick:
 - Within the 51 °F range.
 - We will hold releases at 13,000 cfs out of Keswick through the weekend.
- Sacramento River:
 - CCR Gauge is close to 53.5 °F.
 - May have to open a middle gate next week. Seeing a 97 °F day on the forecast for Redding on 05/22/2023.
 - No change in flows.
- Downstream is looking good. Battle Creek and creeks in the higher peaks have been shown to have residual snow. Temperatures at Balls Ferry and Bend Bridge in Red Bluff have warmed up significantly, 57 °F and 58 °F at Balls Ferry and Bend Bridge, respectively.

Profiles:

- Shasta:
 - Profiles will be produced weekly for Shasta.
 - Temperatures are slowly increasing on the surface. No changes to the profile below 1,000 ft elevation. No major mixing.
 - 52 °F plot: volume comparison is similar to 2019. Above average.
 - 48 °F plot: colder water in the lake this year, which was expected due to the cold winter.
- Trinity:
 - Will obtain most recent data plot today (05/18/2023), check website for updated temperatures in the next day or two.

- Expect temperatures to be colder with a slight projected increase of warmer temperatures on the surface.
- 52 °F plot: storage is increasing at Trinity. Comparable with the drier years but may increase as the snow continues to melt and the reservoir rises.
- Whiskeytown:
 - Will obtain most recent data plot today (05/18/2023). The website will show most updated temperatures in the next day or two.
 - Water is cold with slight warming at the surface.
 - Whiskeytown reservoir is full.
 - Scheduled pulse flow in June for Clear Creek and will have more operating range to try to cushion for that pulse flow. Inflows to Whiskeytown are consistent and should provide enough water for the June pulse flow.
 - In late June, the operating range will tighten to the normal operating range for Whiskeytown.
 - Not expecting to conduct many diversions this summer.
 - 60 °F plot: typical for this time of year.
 - 58 °F plot and 56 °F plot: comparable to most years.
- Seasonal Temperature Outlook:
 - The National Weather Service has not updated their Seasonal Temperature Outlook for May. Most recent update was given on April 20, 2023. Will incorporate the new forecast into the latest round of modeling going forward as it is received. Predicting a warm summer.

8-14 Day Temperature Outlook:

- Issued on May 16, 2023.
- Above normal for Northern California.
- Below normal for Southern California.
- Normal temperatures in Central California.

May Forecast:

- Compared to the April forecast there have been a few minor changes.
- The April information is what is used to put into the inputs into the Draft Temperature Management Plan (TMP). Additional runs have been completed to look at different temperature control points and operations downstream.

- Reclamation will include the May Forecast for the 90% exceedance and use any updated temperature profiles as well as any updated National Weather Service projections of temperatures moving forward.

Additional modeling: Sacramento River Modeled Temperature 90% Exceedance Water Outlook Forecast

Reclamation presented two charts.

The first chart was what was used in the Draft TMP, targeting 53.5 °F at CCR and with 25% L3MTO Meteorology data and April 20, 2023, National Weather Service projections. In addition to the original plot, Reclamation added the 56 °F marker and the graph of Balls Ferry and Bend Bridge temperatures as well.

The second chart showed new temperature model run results with all the same inputs as the first chart. However, operations attempted to target 53.5 °F at Balls Ferry (BSF).

Analysis of results:

- Operating to keep temperatures below 53.5 °F at BSF is difficult because of the warm tributary creeks that join the Sacramento River, primarily Cow Creek.
- The model utilized a full side gate operation (with the closure of all other TCD gates) beginning on May 14 in order to release the coldest water from Shasta Reservoir. The temperature went down to 45°F-46 °F.
- The operation did lower the temperatures temporarily to 53.5 °F at Balls Ferry, but the modeling shows it would be difficult to maintain this temperature throughout the season at Balls Ferry.
- Maintaining the lower temperatures downstream puts a strain on the operations at Shasta and the TCD. This is especially true when not diverting water from Trinity River basin.

SRTTG representatives' questions and comments included:

- USFWS observed that while visiting the Shasta dam, he noticed that one of the river outlets was open and that for the last few weeks the dam has been opening up some of the river outlets occasionally to avoid running all of the power houses at the same time.
 - Reclamation explained that prior to the warmer weather, there wasn't a large need for power in the system, so the need for power generation from Shasta plant was reduced. In the real time market, there are times when the state does not need a large quantity of power generation, so there was a request to decrease power generation. Shasta responds by releasing the water through the river outlets at the top of the dam. Water is pulled out from the 950 elevation level outlets. There is no expectation that river outlet releases will continue now with the increase in warmer temperatures and with more load on the system. Currently, releases from the 950 river outlets provide cooler release downstream than the TCD upper gates based on the latest lake profile.

- There may be a need to open a middle gate soon to cool down the water downstream. Reclamation will continue monitoring.
- CDFW asked whether the cold-water pool volumes would be completely exhausted in the new downstream Sacramento River modeling.
 - Reclamation said that it is unlikely, but what is being presented is that the model run has opened both side gates and there is a slow increase of water temperatures released from Shasta Reservoir.

Shasta Planning Group Update

Reclamation shared with the SRTTG group that the Shasta Planning Group (SPG) met on Thursday, May 18, 2023, and agreed to conduct the additional runs described above. For more detailed documentation of the SPG feedback, see the notes provided on page 10 of the draft.

Based on that modeling, Reclamation suggested sticking with 53.5 °F at the CCR compliance point to decrease pressure on the system. If Trinity had high storage, the approach would be different in that it could be used to ease the burden on Shasta. This scenario would not be appropriate for this water year, due to the limited storage in Trinity Reservoir. The SPG agreed to delay issuing the final Temperature Management Plan for another 1-2 weeks to allow Reclamation to incorporate the most recent profiles and forecasts for May. Otherwise, there is not a lot of change in operations or profiles. Will continue to maintain the 53.5 °F and use the TCD to continue to adjust temperatures by pulling cold water.

SRTTG representatives' questions and comments included:

- USFWS added that one of the interests that the SPG had is how temperature management may affect fall-run Chinook salmon as well as create better conditions for fall-run and winter-run Chinook salmon. We have been hoping to gain information from CDFW on timing, distribution of fall-run Chinook salmon spawning and how different scenarios may turn out. How can this model help shed some light on what could be done for fall-run Chinook salmon this year given the dire circumstances for fall-run Chinook salmon?
 - Reclamation acknowledged this comment and explained that in this modeling scenario, using the side gates early is for the purpose of combatting the warmer tributary inflows to maintain lower temperatures. However, it will put pressure on the fall-run Chinook salmon later in the year since there is a chance for warmer conditions in the river starting in October.
 - SRSC asked USFWS what the critical temperature is in the fall for fall-run Chinook salmon.
 - USFWS said it would be the same as for the winter-run Chinook salmon.
 - SWRCB shared that he did not suggest mining the coldest water this early in the season to lower the temperatures downstream especially when there are uncontrollable factors to consider with warmer waters coming from other tributaries, which would create a substantial trade-off. A later onset of temperature control might be something that could be worth

considering. For fall-run Chinook salmon, it may be worth considering a later onset of temperature management further downstream.

- USFWS added that the tributary inflow will be something to revisit in late May and June. The CCR gauge acts as a buffer there, but it is not substantial.
- USFWS asked Reclamation if the period of highest uncertainty in terms of tributary inflow temperatures begins in late May to June.
 - Reclamation agreed. In 2019 when there were similar creek flows, Reclamation operated to 56 °F at Balls Ferry the whole year. It did a good job meeting the target temperature of 56 °F, but it took the use of more cold water. Shasta is only releasing enough water to meet the 53.5 °F at CCR needed this water year.
- USFWS asked if there is an action that is observed at the TCD before May 29th if that is when the operations were switched to the lower gates.
 - Reclamation explained that the model moved releases to the lower gates because of the temperature patterns that we were seeing. During the L3MTO meteorological development process, we look at the 25% exceedance forecast temperatures combined with similar years in the past. During a heat wave, the TCD releases colder water until the heat wave passes. The late May gate change is a TCD operation to combat the heat wave anticipated in late May.
- SRSC asked Reclamation when the switch was made to side gate in the original TMP modeling.
 - Reclamation stated that the side gates are not expected to be used this year for Sacramento River Modeled Temperature 2023 Apr- 90%- Exceedance Water outlook -25% L3MTO.
 - SRSC asked if that would give some flexibility in the fall.
 - Reclamation said yes: It is similar to 2019 when there were no side gate operations.
- K&W asked if there are any models that could be used to address these concerns. How can SRTTG best support the fall-run Chinook salmon without hurting the winter-run Chinook salmon?
 - Reclamation shared that the operation proposed in the TMP does not necessarily hurt winter-run Chinook salmon. It does not give you the extent of temperature management further downstream, but it does provide some cushion in the fall. The further one pushes temperature compliance downstream during the bulk of the summer, the more strain it puts on the

end of the year. We are not anticipating a problem, but operating for cold temperatures downstream does increase the likelihood that there could be a problem. We do not need to pick to a particular point or temperature and stick with it all summer.

- SWRCB noted that the conservative approach that we have used for forecasting for both inflows and meteorology can cut both ways: there is potential that this is resulting in an overly pessimistic forecast for near term conditions. Looking at the data that Reclamation was referring to regarding the downstream warming between Clear Creek and Balls Ferry ratifies what has been shown in these plots. With that said, Balls Ferry is currently under 56 °F. Suggested receiving more temperature modeling from the SWFSC, since they have the capability to test for multiple scenarios. Agreed with Reclamation that there does not have to be a specific temperature control point set for the entire season.
- USFWS asked Reclamation if there are any updates regarding the possible El Nino conditions and expected heat waves this summer.
 - Reclamation said that the heat that is forecasted this summer could be a result of an El Nino artifact. Reclamation does not have any extra information on the subject.
- NMFS shared that it does not seem appealing to move the compliance point during the summer. Moving it between the fall-run and winter-run Chinook salmon needs would be more productive than moving it during the summer. Also, suggested that SRTTG get more serious with TDM modeling for fall-run Chinook salmon, similar to the calculations already conducted on the American River, as it is important to have a greater understanding of the fall-run and winter-run Chinook salmon tradeoffs. Suggested that SRTTG consider using this type of tool to help aid these decisions.

River Fish Monitoring: 1) carcass surveys 2) Redd counts 3) stranding and dewatering surveys.

Doug Killam, CDFW, provided a River Fish Monitoring update. The winter-run Chinook salmon survey started on May 1st and went through May 18th. To date CDFW has seen a total of 5 carcasses. Spawning is underway. The aerial redd survey was conducted on Monday, May 15 and may have reported one potential new redd, but it has yet to be confirmed. Shallow redd surveys are ongoing but have not seen any shallow redds yet.

- Anne Williams, SRSC said that the SRSC had the net up at ACID for the thiamine treatments. Does CDFW have any updates on that?
 - As of yesterday (May 17), there have been no salmon collected. It is still in the beta testing: they have been cleaning the net but have not reported any salmon so far.

Fish Distribution/Forecasts: 1) Estimated percentage of the population upstream of Red Bluff Diversion Dam for steelhead, winter-run, and spring-run Chinook salmon 2)

Sampling at rotary screw traps at Red Bluff Diversion Dam 3) Steelhead update 4) Livingston Stone Hatchery

Craig Fleming, USFWS, provided an update on Fish/Distribution/Forecasts. USFWS is back to full sampling with the rotary screw traps at the Red Bluff Diversion Dam on the Sacramento River as of May 9th. Currently catching marked and unmarked hatchery fish in the fall-run and spring-run Chinook salmon size categories. Continuing to see a few jump-start winter-run Chinook salmon and late fall-run Chinook salmon daily. No larval sturgeon in the rotary screw traps to date. 100% of the winter-run Chinook salmon have passed to date, spring-run Chinook salmon are at about 99%, and Rainbow Trout are at about 24% as of this date.

Livingston Stone Hatchery Update:

Kaitlin Dunham, USFWS, did not provide a hatchery update.

Topics for Elevation to Shasta Planning Group:

No topics for elevation.

Adjourn

Additional Meeting Documentation

Shasta Planning Group Notes

Thursday, May 18, 2023 5:29 PM, Email from Erica Meyers, CDFW.

Subject: SRTTG Monthly Meeting - Shasta Planning Group Notes.

Shasta Planning Group – May 16, 2023

In attendance: Matt Brown, Kristin White, Matt Holland, Levi Johnson, Kaylee Allen, Howard Brown, Molly White, Brooke Jacobs, Garwin Yip, Dianne Riddle, Lenny Grimaldo

Discussion Items:

- Operational Update
- Update from SRTTG re: Temperature Management Plan

There were two requests from SRTTG member agencies for additional modeling and evaluation from Reclamation prior to submission of the final TMP:

1. NMFS requested modeling a scenario targeting 53.5 F at Balls Ferry to assess impacts and tradeoffs associated with a more downstream temperature control point;
2. State Water Board requested that Reclamation evaluate whether it is within Reclamation's control to maintain 56 at Red Bluff Diversion Dam, and if not, to identify a 56 F control point pursuant to water right order 90-5.

Reclamation agreed to conduct these evaluations, but indicated that further analysis may delay the submission of the final TMP. SRTTG is seeking guidance from SPG on whether the

submission of the TMP should be delayed if necessary to incorporate insights from the additional analysis. SRTTG recommends that TMP be informed by the additional modeling and analysis, even if submission of the final TMP is delayed.

- Reclamation requested NMFS to see if the SWFSC could provide temp modeling support, and NMFS agreed to look into it.

Guidance for SRTTG:

- Shasta Planning Group decided unanimously that the proposed additional modeling is necessary to better understand potential water temperature management this season, and that it is acceptable that this delays release of the Final Temperature Management Plan by 1-2 weeks.

Compiled TMP Feedback

The following are written comments (total: 3) received by Reclamation in response to the draft TMP.

(1) Friday, May 5, 2023 2:45 PM, Email from Derek Rupert, Reclamation.

Subject: SRTTG Update Meeting - Interest in Attendance

Hi Mia,

I'd like to flag the TMP's Clear Creek temperature model results for second look. As Charlie noted in our last meeting, the water temperatures at Igo look too cold.

(2) Wednesday, May 10, 2023 9:31 AM, Stephen Maurano, NOAA.

Subject: SRTTG Update Meeting - Interest in Attendance.

Good Morning Tom,

Thanks for all your efforts operating Shasta during the rollercoaster of the recent water years. In preparation for tomorrow's SRTTG meeting, NMFS wanted to share a few comments on the draft TMP ahead of time to allow some opportunity for consideration:

- Pg 1 - Conditions are predicted to be, "...comparable to other wet years such as 2017 and 2019." What is the estimated TDM using a spawning distribution that had a higher percentage of redds downstream, such as 2019?
- Pg 2 - The TMP anticipates that, "Reclamation can meet 53.5°F at CCR." Can that temperature be achieved further downstream (e.g. Balls Ferry, Jellys Ferry, or Bend Bridge)? If so, when and for how long, and what would be the implications for metrics such as TDM and End of September storage? NMFS recommends modeling maintaining 53.5°F at BSF in particular so the impacts and tradeoffs can be analyzed.
- Pg 3 - Table 4 cites a, "TDM bT (50th percentile) for Stage-independent mortality of 0.026°C-1d-1." This seems close to, but slightly different from 0.024 °C-1d-1 noted in Martin et al 2017. NMFS suggests double checking or citing directly to the appropriate reference to ensure that the correct value is used.

(3) Friday, May 19, 2023 11:14 AM, Matt Holland, SWRCB

Subject: Draft TMP comments, Matt Holland, SWRCB.

Hi Tom,

Thank you for the additional modeling shared in today's SRTTG meeting, depicting operations to meet a 53.5 F daily average target at Balls Ferry, assuming April 90% exceedance forecast hydrology and 25% exceedance L3MTO meteorology. Since the meeting, staff reviewed the temperature and TCD operation records for 2017 and 2019, the two recent years with the most similar hydrological conditions to the current year. In each of those years, temperatures colder than 53.5 F at CCR and 56 F at BSF were generally maintained starting in the second week of May, with a small number of daily exceedances, and BSF was designated as a control point for 56 F. In both years this was accomplished without use of the side gates, and by October, temperatures at RBDD had dropped below 56 F. Accordingly, we recommend that at a minimum Reclamation evaluates maintaining 56 F at Balls Ferry, subject to the constraint of continuing to meet 53.5 at CCR.

Additionally, staff have the following suggestion and request:

- Recommend the following edit to the title: SACRAMENTO RIVER TEMPERATURE MANAGEMENT PLAN FOR ~~WATER YEAR~~ 2023. Including "water year" is confusing given that the temperature management season extends into the fall.
- 508 compliance: Please ensure the TMP is accessible so we can post promptly and avoid the need for Board staff to modify a Reclamation document.