BUREAU OF RECLAMATION

Sacramento River Temperature Task Group Notes

March 28, 2024

Members Attending

- USBR: John Hannon, Lisa Elliot, Tom Patton
- USFWS: Bret Galyean, Craig Anderson, Craig Fleming, Craig Isola, Charles Chamberlain, Elissa Buttermore, Kariss Bridges, Matt Brown, Tracy Grimes
- CDFW: Crystal Rigby, Doug Killam, Erica Meyers, Tracy Grimes, Travis Apgar, Vanessa Guzman Costa,
- NMFS: Evan Sawyer, Flora Cordoleani, Stephen Maurano
- SWFSC: Cyril Michel, Eric Danner
- DWR: Ryon Kuth
- SWRCB: Claudia Bucheli, Diane Riddle, Jeff Laird, Matt Holland, Shay Richardson
- SRSC: Catherine Morales Sandoval, (MBK Engineers), Yeun Lenh (MBK Engineers),
- WAPA:
- Yurok Tribe: Chris Laskodi
- Hoopa Tribe:

Topics/Actions

- Brett Galyen will email a Steelhead update to the SRTTG.
- Tom Patton will inform the group if the Temperature Management Plan (TMP) will be delayed long enough to require an ad hoc SRTTG meeting to review it in early May.
- The Upper Sacramento Scheduling Team will communicate their recommendation for spring flows (timing, duration, and volume) to the SRTTG so that the SRTTG can review and convene to consider.

Welcome, Agenda Review, and Purpose

Victoria Pebbles, Kearns & West, welcomed all participants.

Purpose and Objective

Sacramento River Temperature Task Group (SRTTG) consists of agency representatives having direct interest in cold water pool management on the Sacramento River and meets at least monthly February through October. The purpose of the SRTTG is to "share operational information monthly and improve technical dialogue to inform the development and the implementation of an annual Temperature Management Plan (TMP) for the Sacramento River." The TMP is developed by the U.S. Bureau of Reclamation (Reclamation) in accordance with California State Water Resources Control Board Water Rights Order 90-5 to assist with improving and stabilizing Chinook salmon populations in the Sacramento River.

Hydrology Operations, Forecasts, and Temperature Management

Reclamation presented the hydrology and operations updates.

Northen Sierra Precipitation:

- Conditions have stayed relatively wet since the previous meeting.
- The 8-Station index is at 95% of the average for this time of year with 40.9 inches of precipitation to date. This is less than last year, but still a good year for Northern California.
- There is a system forecasted to arrive soon, and afterwards the forecast shows warming and drying in the first part of April.

California Snow Water Content:

- In the North, snowpack is at 115% of the April average. Statewide snowpack is at 102% of the average for this time of year.

Current Storage, Releases, Water Temperatures and Current Operations: Daily CVP Water Supply:

- Lewiston Dam is making a typical 300 cfs winter-time release from Trinity Reservoir. That will change in April when flow increases per the Record of Decision (ROD). The water year type will be finalized when the April 1 Bulletin 120 update is released, but it is likely to be a wet year. Reclamation will then schedule Trinity River flows as outlined in the ROD for this year type.
- Releases from Keswick are currently 4,400 cfs. The flows will decrease to 4,200 cfs today and decrease further to 4,000 cfs tomorrow and through the weekend to facilitate the Anderson Cottonwood Irrigation District (ACID) Dam installation. ACID is installing flash boards to prepare for diversion season beginning in April.
- Overall reservoir storage looks good. The carryover storage from last year helped. Trinity Reservoir is at 121% of the 15-year average. Trinity Reservoir is just under 2 MAF and will reach it in early April. Shasta storage just exceeded 4.1 MAF yesterday. Reclamation is starting normal filling at Whiskeytown Reservoir using natural flows rather than diversions.
- Reclamation is releasing a pulse flow for Clear Creek: timed with rain from last weekend, the pulse peaked last week at 840 cfs, and is tapering off so that flows will be down to 200 cfs next week.

Temperature Management:

- On March 6, the middle gates were closed so that only the upper gates on the Temperature Control Device (TCD) were open at Shasta Reservoir. The gate configuration will remain that way until colder release water is needed.
- The surface of Shasta Reservoir has not warmed up too much yet. The temperature has been 50 to 51°F coming out of TCD upper gates.
- Reclamation is releasing some water out of Spring Creek Powerplant but will taper off as they start to fill Whiskeytown Reservoir in the first part of April. There is not much release out of Spring Creek Powerplant in the spring at this point, but releases will increase in the summer.
- Reclamation is keeping a close eye on the Clear Creek River (CCR) gage to manage temperatures to meet the temperature target at of 53.5°F. This was the temperature target and control point from last year's TMP. Reclamation will maintain status quo and will not make TCD changes until later in the season to meet temperature targets at Clear Creek.

Reservoir Profiles and Cold-Water Pool: Graphs on Isothermobaths-2024, Graphs on Cold Water Pool Volume, Percent Exceedances (1998-2023)

- Currently Reclamation releases reservoir profiles every two weeks, but they will start to be released weekly in May.
- Shasta Reservoir:
    - The surface of Shasta warmed up to 54 to 55°F. There is still a lot of cold water.
    - Temperatures at Shasta Reservoir warmed up a little over last profile, but it is still cold throughout the lake. The colder water volume deeper in the lake is increasing which is expected after the recent colder storms.
    - Shasta has a good cold-water volume of 52°F and colder. This year's volume is above average and similar to 2016. There is also a large snowpack volume that will provide cold water input into Shasta this spring.
    - The 48°F and colder water volume has increased since the previous profile.
    - The 48°F cold water pool volume is just under 50% exceedance and that should increase with more snowmelt run off.
- Trinity Lake:
    - Storage approaching 2 MAF feet of storage and very cold. This volume of 52°F and colder water is very average.
- Whiskeytown Lake:
    - The isotherm plot is pretty typical for this time of year.

Seasonal Temperature and Precipitation Outlook:

- The forecast shows above average temperatures. There are equal chances of being above or below normal for precipitation.
- Summer months for July, August, and September are forecasted to be a warmer than average summer for all of U.S. and maybe even a bit warmer in the West.

90% forecast: Estimated Central Valley Project (CVP) Operations 90% Exceedance

- The 90% forecast predicts a lower storage for March than the current storage levels of 4.1 MAF. The reservoir storage will end the spring even higher.
- Storage projections for the end of the water year in September are not as good as last year but still good, including Trinity Reservoir over 2 MAF and Shasta Reservoir at 2.5 MAF.
- The Sacramento River flood releases are decreasing in April, though this modeling does not account for the planned increased Keswick flow releases to meet Delta needs.
- 44 TAF at Carr Powerhouse in May for filling Whiskeytown Reservoir. The annual diversions through Carr are on the lower side because of the desire to keep Trinity Reservoir storage higher and because there is good water supply on the Shasta system.

50% forecast: Estimated Central Valley Project (CVP) Operations 50% Exceedance

- The 50% forecast shows wetter conditions that are more in line with real conditions.
- Predictions indicate Shasta Reservoir topping out at 4.4 MAF storage. Reclamation is anticipating filling Shasta Reservoir this year. Trinity Reservoir is looking good and peaking at 2.1 MAF. The forecast shows a good amount of carryover storage going into next year: 1.8 MAF at Trinity Reservoir and over 3 MAF at Shasta Reservoir.
- There is a higher flow through the summertime, up to 12,000 cfs, to get Shasta Reservoir ready for next year. 3.2 MAF is Shasta's threshold number for flood control for next winter.
- There are more diversions through Carr forecasted for June but that may change when the Trinity ROD is scheduled. Reclamation is trying to avoid additional spill at Trinity Reservoir and to manage water temperatures at Whiskeytown Reservoir and on the Trinity River.

Questions and Comments

USFWS asked if the good cold-water conditions in Trinity Reservoir might result in more cold water coming through Whiskeytown Reservoir to the Sacramento River early in the season than previously forecasted.

- Reclamation replied that the two river and storage systems are independent. Reclamation is considering bringing over more water from Trinity to the Sacramento River system since there is more available. Diversion helps keep water moving through Whiskeytown Reservoir and slows down the rate of draw from Shasta's Reservoir. Even though the

water from Spring Creek Power Plant later in the summer will be warmer, it still helps the Sacramento River to bring water from the Trinity to preserve storage in Shasta. However, the higher inflow to Trinity basin produces a higher ROD volume. Reclamation was originally going to increase diversion from the Trinity River to the Sacramento River, but since the ROD-flow volumes were higher, they eased off on that diversion.

USFWS brought up the topic of the Carr Powerhouse diversions in June, noting that 12 TAF diversion is low. In the past, it was thought that the low storage would produce warmer water temperatures in Whiskeytown Reservoir and Clear Creek. USFWS asked if Reclamation flows had been that low in the past?

- Reclamation noted the storage is on the low side. They will have to wait to see the pattern from the Trinity ROD and then refine those diversions. The Trinity ROD will come out shortly. If additional water is needed in the early summer to cool temperatures, then Reclamation will increase flows.

The Yurok Tribe asked whether dam safety releases on the Trinity will be necessary if next year is another wet year with a lot of carryover storage.

- Reclamation responded that there is a possibility of needing dam safety releases in the event of another wet year with high carryover storage. There is also a Carr Powerhouse tunnel outage over the winter. Reclamation will have to coordinate with the Trinity staff to figure out how to safely meet flood control and dam safety criteria and make flow releases more beneficial to fisheries. They were planning to take Carr Powerhouse tunnel offline for significant maintenance last year but had issues with contracting. The Carr Powerhouse Tunnel will now come offline in November this year. The Carr Powerhouse outage is not reflected in the 50% exceedance forecast, so they will adjust when the outage is finalized. Reclamation will change the Trinity River releases as well. 1.85 MAF is the storage threshold at Trinity Reservoir for dam safety releases. In this forecast, the reservoir storage levels are expected to approach the threshold in January and February. The water year will start with high storage at Trinity Reservoir and potentially have no diversion capability if there is outage.
- Reclamation clarified the reason there is not a “Normal” water year type on the 8-station index is that this figure just examines the accumulation of precipitation. Water year types examine runoff and flows, and there are different indices. Reclamation clarified the water year type is above normal. But in terms of the precipitation index, it is below normal. For runoff, it is above normal due to last year being wet and making for wetter condition going into this year. There is uncertainty for runoff prediction.

Temperature Management and TDM Modeling

Tom Patton, Reclamation, discussed the relevant temperature dependent mortality (TDM) modeling.

The model assumptions include:

- The model is using profile from Shasta Reservoir last week.

- It uses a very warm forecast in line with National Weather Service predictions.

The model predicts:

- Using the side gates to meet temperature targets, but it is still early in the season.
- Meeting 53.5°F temperature target at CCR needed to operate to Tier 1.
- Temperature of flow releases of 50°F from Shasta Reservoir will be necessary to meet 53.5°F at CCR.
- Carryover storage of 2.55 MAF with an estimated end of September cold water volume of 633 TAF.
- Early fall water temperature on the Sacramento River at CCR around 55–56°F mark. This will likely look better in subsequent model runs.
- Clear Creek flow temperature was like last year with warming into the summer. Maybe not meeting 56°F in summer but then temperatures are predicted to cool.

Questions and Comments

- Reclamation clarified there is no change to the status of the Coordinated Operations Agreement balance. The Delta is still in excess. Fishery take and managing to the Old and Middle River index is driving Delta operations. It seems that the Delta will need flow for Delta salinity and outflow management in April, so there is a potential to ramp up Keswick release flows in early part of April. Reclamation is estimating 30,000 cfs for 20 days in the delta so that cold mean additional release for Keswick.

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

Doug Killam, CDFW, provided river fish monitoring updates.

- Adult winter-run Chinook are in the system, and CDFW is collecting them. No monitoring is occurring for in-river fish. According to historical timing, the winter-run Chinook should all be in the upper Sacramento River system.
- CDFW is finishing surveys of late fall-run Chinook through April. CDFW is not conducting redd counts or carcass surveys. They are doing stranding surveys and rescuing late fall-run Chinook in stranding pools. The peak fall-run Chinook migration was in January and early February, and now CDFW is just keeping an eye on the system. There may be some pre-spawn winter run mortalities in adult fish if they die early.

Fish Distribution/Forecasts

Craig Fleming, USFWS, presented on the estimated percentage of the population upstream of Red Bluff Diversion Dam for steelhead, winter-run, and spring-run Chinook salmon:

- Fall-run Chinook hatchery fish are moving through the system.

- Spring-run Chinook-sized juveniles and other juveniles are being captured but not many.

Brett Galyen, USFWS, did not have an update on steelhead prepared for the meeting but offered to email it to the group. He provided the Livingston Stone National Fish Hatchery (LSNFH) updates:

- 28 adults (18 females and 10 males) on hand. 40 in the traps on Tuesday.
- The genetic results will be in soon. Staff said that the fish looked like they are in good condition. There are lots of hatchery fish, mostly winter-run Chinook.
- USFWS will send out an email on Friday to update trapping numbers.

Questions and Comments

- USFWS clarified that to date, the numbers of fish trapped are a little lower than average, but the numbers this week were promising.

USST Spring Pulse Flows

The group discussed the pulse flow options recently discussed by the USST Spring Pulse Flows group and confirmed the support for the approach proposed by that team, i.e., Option B below: to propose no spring pulse flow release in the first half of April and instead rely on increased flows for the Delta to assist Coleman Hatchery fish to out-migrate. The options under consideration were:

A. A spring pulse flow release in first half of April, or

B. No spring pulse flow release in first half of April and continued planning around later April/May pulse flow(s) *[recommended by the Spring Pulse Planning Group and supported by the SRTTG]*

    i. Rationale included: The USST/SRTTG can instead rely on increased Keswick flows of around 10,000 cfs that are being released to meet Delta needs in first half of April to support the Coleman Hatchery release during that period. The exact magnitude and timing of the increased releases depends on the weather and flow through the system. Most of the additional flow for the Delta will come from Shasta Reservoir, and some might come from Folsom, Oroville, and the Feather River Reservoirs as well. This would simulate a pulse but will not be considered a spring pulse proposed and overseen by the Spring Pulse Planning Group; the increased release is considered a Delta management operation action.

    ii. Optimize benefits by:

        1. Coordinating the timing of the Delta management action for increased Keswick release with the Coleman Fish Hatchery release.

        2. Preserving storage of water in Shasta Reservoir for one or two spring pulse actions in late April or early May.

Terra Alpaugh, Kearns & West, reviewed the spring pulse flow objectives, planning process, and some of the opportunities, constraints, and interests for timing and magnitude of potential spring pulses the Spring Pulse Planning Group discussed in recent meetings.

- The primary objective for pulse flows is maximizing survival of out-migrating spring-run Chinook.
- Threshold for pulse flow: If Shasta Reservoir hits 4 MAF before May 1st, the USST can consider recommending pulse flows of any durations as long as they collectively require less than 150 TAF of stored water. Reclamation could also determine, in coordination with the Upper Sacramento scheduling team, that while the reservoir is less than 4 MAF, there is sufficient water to do a pulse of up to 150 TAF.
- The Spring Pulse Planning Group analyses include:
    - Improvements in the predicted survival of outmigrants
    - Water cost of the proposed spring pulse flows
    - Implications on temperature-dependent mortality for the season.
- Considerations for pulse flows include:
    - Flows needed during ACID Dam installation and once the diversion is installed.
    - Potential increased diversions for irrigation in May.
    - Avoiding exceeding 1,800 cfs at Wilkins Slough due to seepage
    - Ability to coincide with a rain event and associated increases in turbidity and fish movement down tributaries.
    - Need for one-week notice prior to pulse flow for the Southwest Fisheries Science Center to tag fish.
    - 2-3 days time for operators to schedule the changes of releases.
- Potential co-benefits are:
    - Maximizing the survival and outmigration of hatchery fish from Coleman Fish Hatchery. It is a priority this year and those releases are likely to happen the week of April 8.
    - Improving immigration of spring-run Chinook adults to Clear Creek. A pulse flow could be coordinated with Clear Creek pulses scheduled for May to support the return of spring-run adults.
    - Increasing geomorphic benefits.
    - Increasing floodplain connectivity.

Discussion

Cyril Michel, NMFS SWFSC, gave an overview of the latest analysis that looked at 275 potential

pulse flow options and assessed when pulses might be most beneficial to outmigration survival, as well as calculating their water cost. The model did not show any benefit to pulses during the first three weeks of April because of the already high flows forecasted by Reclamation; however, Cyril stressed that just because the model does not show benefits above 11,000 cfs does not mean there would not be benefit to the fish from even higher flows. The Spring Pulse Planning Group was close to recommending pulse flow in April because of their particular interest in supporting the survival of hatchery fish this year (particularly considering the very low numbers of natural fish), but then the other option (Option B above) of using Delta-driven water to support Coleman Hatchery releases was proposed.

The SRTTG Group members supported the recommendation of the Spring Pulse Planning Group not to pursue a formal spring pulse flow during the first half of April and to continue their analysis around the best pulse flow scenario or scenarios to propose for later implementation.

Terra Alpaugh reviewed the process of recommendations for spring pulse flows. The Spring Pulse Planning Group shares their recommendation with the SRTTG and the SRTTG elevates those recommendations to Shasta Planning Group, who then provides input to Reclamation. Reclamation makes the final decision on whether to implement the pulse scenarios outlined.

Reclamation confirmed their intention to treat the increase in Keswick releases as a Delta management operation action. Reclamation also confirmed that operators would coordinate with Coleman Fish Hatchery to optimize benefits of the increased Keswick release with hatchery release timing. Reclamation confirmed that operators have coordinated with the Coleman Fish Hatchery in this way in the past.

Kearns & West asked if anyone had a concern with the recommendation of pursuing no spring pulse flow in early April and instead relying on Reclamation increasing Keswick releases during that period as an operations action to meet Delta needs and coordinating with Coleman Fish Hatchery.

- Nobody expressed a concern or divergent opinion.

Kearns & West asked if anyone in the SRTTG had concerns with the process approach, i.e., that the increased Keswick flow is not being planned as part of the Spring Pulse Planning Group and therefore is not required to go through formal proposal and approval steps outlined in the Spring Pulse Study Plan?

- Nobody expressed a concern or divergent opinion.

Questions and Comments

Kearns & West noted that depending on the timing of the recommended pulse flow(s), there may be a need for an ad hoc SRTTG meeting prior to the regular April meeting.

- USFWS requested that the SRTTG ad hoc group meet well before any spring pulse flow start dates.

Schedule

Reclamation provided information on the expected Temperature Management Plan schedule for

April which will include:

- In April, Reclamation will conduct temperature modeling based on the April forecast. If the forecast is delayed, it will delay the release of the draft TMP.
- End of April, Reclamation will release the draft TMP. Reclamation expects the TMP may be similar to 2023 in terms of managing a Tier 1 year and 53.5 at CCR.
- The SRTTG will convene an ad hoc meeting if the forecast is delayed past the next scheduled SRTTG meeting to give the group the opportunity to discuss prior to finalizing the TMP in May.

Adjourn