



# CVP Water Temperature Modeling Platform, MTC Shasta TCD Modeling Subgroup – Meeting #1

Wednesday, July 27, 2022; 12:00 p.m. – 2:00 p.m.

## Meeting Objectives

Provide an effective venue for topic-specific discussions under the Modeling Technical Committee (MTC) framework. Establish common understanding of the functions of Shasta Temperature Control Device (TCD). Develop shared knowledge for how Shasta TCD is modeled in the WTMP element model and receive input from subject matter experts.

## Agenda

See [cvp-wtmp-shasta-subgroup01-agenda-2022-07-27.pdf](#)

## Attendees

See [cvp-wtmp-shasta-subgroup01-participants-2022-07-27.pdf](#)

## Handout

See [cvp-wtmp-shasta-subgroup01-handout-2022-07-27.pdf](#)

## Summary

The first meeting for the Shasta TCD Subgroup was to provide a venue for MTC members who would like additional detail of modeling approach and characterization of the TCD beyond what are discussed in the regular MTC meetings. This subgroup was established based on MTC04 discussion. The attendees either volunteered in the MTC04 meeting or subsequently recruited for their expertise. Opportunities were afforded for follow-up questions and exchange of ideas. This 2-hour online meeting was attended by 21 participants among 27 registered. The next MTC meeting is scheduled on 10/6/2022 from 1:00 p.m. – 4:00 p.m.

## Meeting Logistics and Welcome Remark

Mr. Yung-Hsin Sun (Stantec) went through the logistic and expectations of the meeting. The main focus of this meeting is to provide additional detail of the modeling approach and characterization of the Shasta TCD and to solicit feedback from the MTC participants. The request

is for subgroup members to facilitate information sharing and knowledge transfer to their peers, managers, and other subject matter experts.

The charge for the MTC Shasta TCD Subgroup participants were to provide input to improve the model representation of Shasta TCD for water temperature management to accomplish the goals and objectives of the project and to establish common understanding about the capability and limitations of the resulting model. Knowledge of additional information that may benefit the model development (e.g., bathymetric data) was also welcome. The subgroup will meet as needed throughout the project to discuss additional detail of Shasta TCD modeling beyond the information shared in regular MTC meetings.

### **Featured Discussion: Shasta TCD Background**

The first discussion session by Ms. Randi Field (Reclamation) started with a review of the Shasta TCD. This discussion included a review of the State Water Resources Control Board (SWRCB) Water Right Order 90-5 which set the terms and conditions for fishery protection and maintenance of water quality in the Sacramento River below Shasta Dam, Keswick Dam, and the Spring Creek Power Plant. Next, the discussion highlighted the 1991 Planning Report by Reclamation that set design concepts for the Shasta outflow temperature control and a planning report/final environmental statement released in 1991 that included discussion of power bypass. The construction of the Shasta TCD started in the 1990's and was completed in 1997. The discussion concluded with how Shasta Dam operators monitor real-time conditions, use forecasting, and rely on previous experience to control the top of the TCD with gates that move up and down.

### ***Questions and Feedback***

- No questions or comments

### **Featured Discussion: Shasta TCD Modeling Considerations**

The next discussion by Mr. Mike Deas (Watercourse) focused on the modeling approach and considerations for the Shasta TCD. This featured review of Shasta TCD basics and key TCD attributes. Next, the discussion highlighted the model features and domain with focus on the CE-QUAL-W2 and HEC ResSim models and the calibration objectives. Next, the discussion focused on how the TCD is represented in the model with leakage assumptions, large gates, side gate, and selective withdrawal. The discussion concluded with an overview of forecasting and time for discussion.

### ***Questions and Feedback***

- A member asked if it was possible to visualize the TCD withdrawal zone.
  - The team responded that the presentation has visual examples of the withdrawal zones.
  - A member commented that the ResSim model can show a contour of withdraw magnitude over time.
- Referring to the TCD representation of side gates, a member asked if the results from the latest model development of the Sacramento River contractor W2 model has been incorporated into this modeling effort.

- The team responded that the results from the Sacramento River contractor W2 model have been incorporated into the model.
- A member asked if updated bathymetry data around the TCD is being used for the model or if there are any plans to update the bathymetry data around Shasta Dam.
  - The team confirmed that more recent and improved bathymetry data within 1miles upstream of the dam are used for the current work. The bathymetric data acquisition is expensive and time consuming; the activities would go beyond the current project schedule.
- Referring to the TCD representation of large gates, a member asked how the model distributes the flow through the gates.
  - The team responded that the model operates based on downstream temperature targets. The temperature target is given as input to the model and the model determines how to meet the temperature target based on the remaining cold-water pool.
  - The member commented that there should be some hydrodynamic rules associated with determining the amount of flow that goes through the three gates and not operated to just meet downstream temperature goals.
  - The team responded that they do not have any data to develop hydrodynamic restraints to determine the hydrodynamic rules to operate the large gates. The model uses a parameterization approach and tries to recreate historical results for the model development.
- A member asked if there any plans to fix the TCD leakage, considering the model assumes a leakage of 20 percent of total outflow.
  - The team responded that Reclamation currently has a curtain next to the TCD used for operating temperatures. Real-time operators recognize the leakage and management tries to operate to take advantage of leakage and adjusts operations based on results.
- For TCD forecasting, can the model run the TCD results on a daily basis. Is this the ultimate goal of the framework to estimate TCD and leakage on a daily basis rather than a weekly or monthly basis to assist in decision making for operators?
  - The team responded that in the Phase II of the modeling, will investigate how to use the modeling framework to incorporate uncertainty and how to set up an ensemble of various scenarios to run and review results. The tool will help people consider these questions. The models are using an imperfect forecasting but can run the model quickly and review model output to make quicker decisions. The framework works to getting closer to that daily operation basis.
  - The team reiterated that the purpose of the framework is to develop a logic structure to address the daily operation question. The framework is developed to streamline the workflow between data input, model run, model output, data reporting, and operator decision making. The framework can accommodate new models within the framework for future expansions of capabilities and interests.

- The team shared references for some of the graphics used in this presentation.
  - Water Temperature Management in Reservoir-River Systems through Selective Withdrawal. Reference Technical Memorandum for Central Valley Project Operation, California. (Reclamation, September 2017)
  - Shasta Lake and Keswick Reservoir Flow and Temperature Modeling – Development Report (Watercourse, December 2020). Prepared for Sacramento River Settlement Contractors.

## Wrap Up and Next Steps

The meeting was concluded with the following next steps.

- Report back comments to larger MTC group
- Engage this subgroup as needed
- Complete the modeling development and initiate Phase II activities
- Next MTC Meeting: Thursday, 10/6/2022; 1:00 p.m. – 4:00 p.m. • A separate email will be sent out with meeting registration information.
- Scheduled topics: • Continued discussion of Sacramento/Trinity River Water Temperature Model
- Continued discussion of American River Water Temperature model
- Continued discussion for Stanislaus River Water Temperature Model