BUREAU OF RECLAMATION

CVP Water Temperature Modeling Platform, Modeling Technical Committee Meeting #6

Thursday, October 6, 2022; 1:00 p.m. – 4:00 p.m.

Meeting Objectives

Provide an effective venue for topic-specific discussions under the Modeling Technical Committee (MTC) framework. Establish common understanding of project status. Share common understanding of the outcomes from recent subgroup activities and mid-term peer review. Provide opportunities for input on interim products and collaboration for three river basin model development.

Agenda

See 20221006 WTMP MTC06_Agenda_Accessibility.pdf

Attendees

See 20221006 WTMP_MTC06_Participants_Accessibility.pdf

Summary

The MTC met to establish a common understanding of project status and upcoming topics of MTC discussions, provide opportunities for input on interim products and collaboration, and report the first subgroup activities and outcome. The sixth MTC meeting was conducted in a consistent format as previous MTC meetings. The main topics included summary of the outcomes from the Shasta TCD subgroup meeting and mid-term peer review, continued discussion of development of the Sacramento/Trinity River Water Temperature Model, the American River Water Temperature Model, and the Stanislaus River Water Temperature Model. Opportunities were afforded for follow-up questions and exchange of ideas. This 3-hour online meeting was attended by nearly 55 participants among 72 registered. The next MTC meeting is scheduled on 1/5/2023 from 1:00 p.m. – 4:00 p.m.

Meeting Logistics and Welcome Remark

Mr. Yung-Hsin Sun (Stantec) started the meeting with reviewing the agenda and logistics. Mr. Sun also provided a brief review of the future agenda topics for the MTC meetings and updates on the

project website which includes meeting information, fact sheets, and deliverables. Mr. Sun proceeded to facilitate the MTC meeting.

Ms. Randi Field (Reclamation) provided welcoming remarks and recapped for the group the vision for the Water Temperature Modeling Platform (WTMP) project to modernize systemwide water temperature modeling and analytics; develop professional standards and foster transparency; consistent use for real-time, seasonal, and long-term planning; and accommodate continued technological advancement. Ms. Field thanked the MTC members for the community-based collaborative WTMP development and requested continued support and collaboration to leverage technical expertise.

Featured Discussion: Reporting Out Shasta TCD Subgroup and Mid-Term Peer Review

Mr. Sun provided an update on the Shasta TCD modeling subgroup meeting, which was held on 7/27/2022 and was attended by 21 participants. The goal of the subgroup meeting was to provide an effective venue for topic-specific discussions under the MTC framework, establish common understanding of the functions of Shasta TCD, and develop shared knowledge for how Shasta TCD is modeled in the WTMP element model and receive input from subject matter experts. Mr. Ming-Yen Tu of California Department of Water Resources shared their experience from ongoing developing a water temperature model for the Oroville Facilities facing similar challenges and the solutions for modeling. The major input from the subgroup included questions about the field data near the dam and TCD to improve model representation, distribution of flow through a large gate, and consideration of potential TCD leakage mitigation. These inputs were noted for future considerations of model updates.

Ms. Field provided an update on the independent scientific peer review process, with the goal to provide an external, independent review of the critical assumptions, technical approach and resulting products of the WTMP Project. Reclamation is partnering with Delta Stewardship Council (DSC) for the peer review process. The mid-term review occurred on 7/19/2022 and 7/20/2022 and final review is tentatively scheduled for Summer 2023. The initial findings of the mid-term review are posted at the DSC site with delivery of the report with final findings and recommendations expected in mid-October. Ms. Field summarized the initial response to the review panel's initial findings. Many of the initial findings were for perspective, these comments address incomplete work to be covered in Phase II of the WTMP development. Certain suggestions are beyond the scope of a decision-support tool; where appropriate, the team will forward them to the right audience for consideration. The WTMP will incorporate input based on the mid-term review report in the subsequent project development.

Questions and Feedback

- A member asked a question regarding the Shasta TCD curtain installed in 2015. How was the curtain represented in the model development, as the curtain might affect flow regimes with changes to the source of leakage?
    - The team responded that the curtain was installed in 2015 for a very short period, around 6 to 7 weeks. Reclamation also deployed the curtain in 2020. While these periods where the curtain was deployed may result in different sources of leakage, but due to the short period of implementation it was not considered a factor with significant effects on the flow regime for model calibration purposes.

- **CORRECTION:** The team would like to make a correction to the information shared in the MTC meeting about the thermal curtain use. In addition to 2015 deployment, reclamation deployed the Middle Gate TCD curtain to support water temperature management and alleviate growing concerns over expected Shasta Dam TCD performance in 2020. Divers completed the deployment of the Middle Gate curtain on site on September 16, 2020, to reduce warm water leakage into the TCD, increasing the predictability of resulting water temperature downstream. The event was reported in the MTC meeting mistakenly to occur in 2018; however, it occurred in 2020. The team apologizes for any confusion it may have caused.

Featured Discussion: Sacramento/Trinity River Water Temperature Model Development - Calibration/Validation

The second discussion session by Mr. Mike Deas (Watercourse) and Mr. John DeGeorge (RMA) started with a review of the Trinity, Lewiston, and Whiskeytown CE-QUAL-W2 (W2) model results. Model results of temperature profiles upstream of the dams and performance statistics of vertical profiles near the dams were presented. The next steps for the Trinity, Lewiston, and Whiskeytown W2 modeling include continued sensitivity testing and refinements, model framework testing, and documentation.

Next, the discussion focused on the Upper Sacramento ResSim Model, which covers Shasta, Keswick, and Sacramento River to Red Bluff. The discussion included a summary of the Phase I calibration objectives met on Shasta, Keswick, and Upper Sacramento River. The Shasta TCD operation is well represented for historical conditions. Remaining calibration and data issues will continue to be refined in Phase II work. Plans include implementing an improved stream geometry for Clear Creekfor the Upper Sacramento River in 2023. The discussion then summarized the W2 and ResSim comparison simulations. Shasta W2, Keswick W2, and ResSim Upper Sacramento River configuration in the WTMP modeling framework compared to ResSim using the same boundary conditions match results of Shasta Lake temperature profiles and downstream temperature time series very well. The discussion concluded with asking for MTC feedback on the calibration outcomes for the models, use of multiple performance statistics, and any missing critical check/review on model calibration/validation.

Questions and Feedback

- A member commented on the model statistics showing some negative and positive average mean bias on the Trinity River. The member suggested that instead of trying to calibrate for all years in the simulation period to give higher priority on the temperature management season when calibrating the model.
    - The team responded that the model is calibrated for the entire system and the average mean bias is expected to be near zero, but not expected to be near zero for all years and all locations. Quality of data is the issue for the model calibration. The team also clarified that the performance metrics selected were to evaluate the model looking at both the mean bias and mean absolute error together and not only using the mean bias for assessing the calibration. The calibration did target zero for average mean bias.

- The team added that it is important to have correct representation of temperature stratification in all simulation periods because all periods influence the temperature management season. The goal is to build a robust model under historical conditions and under new future conditions (i.e., climate and operations). Seasonal performance metrics were presented in the MTC05 meeting (July 7, 2022) and these can be developed for these models as reference. The team clarified that the full calibration statistics will be explained further in the report.

Featured Discussion: American River Water Temperature Model Development - Calibration/Validation

The next discussion by Mr. Craig Addley (Cardno, now part of Stantec) and Mr. DeGeorge focused on discussing modeling approach and results for the Folsom Lake and Lake Natoma Reservoir CE-QUAL-W2 calibration and validation. They discussed and presented results of the Phase 1 calibration objectives met on Folsom, Natoma, and American Rivers. The Folsom temperature control shutter operation is well represented for historical conditions and will perform further refinement of river segments to improve diurnal range during Phase II. The next steps include continued calibration/validation, sensitivity testing, other refinements, model framework testing, and model documentation. The discussion concluded with asking for MTC feedback on the calibration outcomes for the models, use of multiple performance statistics, and any missing critical check/review on model calibration/validation.

Questions and Feedback

- No questions or comments.

Featured Discussion: Stanislaus River Water Temperature Model Development - Calibration/Validation

The next discussion by Mr. Deas introduced the Stanislaus River water temperature model development and initial model setup. The topics included a review of CE-QUAL-W2 preliminary configuration for New Melones Lake and Tulloch Lake and data inventory of existing bathymetry data and interpolation for New Melones, Tulloch, and Goodwin. The next steps include developing geometry and boundary conditions and continued model testing for calibration and validation. The discussion concluded with asking MTC members for assistance in acquiring specific data sets, any critical data missing for model development, and any important elements that should be included.

Questions and Feedback

- No questions or comments.

Wrap Up and Next Steps

The meeting was concluded with the following next steps.

- TM development and distribution for review (targeted in November and December)
    - Data Development TM

    - Model Calibration/Validation TM: Sacramento/Trinity River and American River Model
- Planned modeling detail subgroup meetings after draft TM available for review (likely January 2023)
- Continued model development and framework implementation
- Next MTC Meeting: Thursday, 1/5/2023; 1:00 p.m. – 4:00 p.m.
    - A separate email will be sent out with meeting registration information.
    - Scheduled topics:
        - Stanislaus River models
        - Other model development topics, if needed
        - Characterization and communication of model uncertainty