CVP Water Temperature Modeling Platform, Modeling Technical Committee – Meeting #4

Thursday, April 7, 2022; 1:00 p.m. – 4:00 p.m.

Meeting Objectives

Establish common understanding of project status and upcoming topics of Modeling Technical Committee (MTC). Review and provide comments on model selection and modeling framework selection and recommendations for implementation.

Agenda

See *20220407 WTMP_MTC04_Agenda_Accessibility.pdf*

Attendees

See *20220407 WTMP_MTC04_Attendees_Accessibility.pdf*

Summary

The MTC met to establish common understanding of project status and upcoming topics of MTC discussion, provide opportunities for input on interim products and collaboration, and report the first subgroup activities and outcome. The fourth MTC meeting was conducted in a consistent format as the previous MTC meetings. The main topics included continued discussion of development of the Sacramento/Trinity River Water Temperature Model, the closure discussion on data acquisition and database management, summary reporting of the discussion and outcome of the habitat data subgroup, and the introduction of development of the American River Water Temperature Model. Opportunities were afforded for follow-up questions and exchange of ideas. This 3-hour online meeting was attended by about 60 participants. The participation was affected by concurrent meetings scheduled for related issues and projects due to various reasons. Reclamation has reminded other parties about the standing schedule for MTC meetings to avoid future conflicts. The next MTC meeting is scheduled on 7/7/2022 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 report on the team's recent well-received presentations on April 5 in the annual

meeting of California Water and Environmental Modeling Forum. Mr. Sun facilitated the process throughout the MTC.

Ms. Randi Field (Reclamation) provided welcoming remarks and recapped for the group the vision for the 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.

Responding to comments and suggestions from the Habitat Data Subgroup, Ms. Field reiterated that to maintain project focus, Reclamation will defer the extension of the current WTMP model domain until the initial implementation is completed.

Ms. Field also announced Reclamation's new research under the science and technology grant program with National Center for Atmospheric Research. The proposal entails evaluating water temperature modeling and prediction in the Sacramento River Basin: meteorology forcing datasets/inflow temperature. The project was initiated in October 2021 and project kickoff occurred in mid-March 2022. This project is a 2-year effort. Major tasks for Sacramento River Basin meteorological temperature data development includes evaluating existing forecasting methods and skills. This project will focus on the question of improving current forecasting capabilities using new meteorological inputs and investigate methods to develop inflow temperature. Reclamation will provide periodic updates to MTC members.

Lastly, Ms. Field announced 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 who will host the peer reviews. A mid-term review will occur in Summer 2022 and final review in Summer 2023. The anticipated outcome of this process is to improve robustness and transparency of the WTMP project development and outcome.

Featured Discussion: Sacramento/Trinity River Water Temperature Model

The first discussion session by Mr. Mike Deas (Watercourse) and Mr. John DeGeorge (RMA) started with a recap on the selected models and domains for the WTMP representation of the Shasta/Trinity system. The discussion then focused on data development and model performance metrics. Next, the results of CE-QUAL-W2 model development and preliminary model calibration results were shared. The discussion concluded with reviewing the HEC-ResSim model development and preliminary model calibration results.

Questions and Feedback:

- A member asked if the WTMP model performance metrics can be assessed for a targeted seasonal period (e.g., June – October)? At Shasta, the summer period may be harder to capture, and it would be helpful to understand the model performance in each season. The

team confirmed that the model has this capability and will include seasonal summary in the reporting.

- In reference to the model performance metrics developed for stage, flow, and water temperature, a member asked if rather than using a fixed value for the metric (i.e., ± 0.5 feet, ± 50 cfs, ± 0.75 °C), wouldn't a percent value be better? The team responded that percent value can be used to calculate the stage information, the WTMP decided to use fixed stage and fixed flow information.
- A member asked about the lag between the input and model output when generating model bias estimate? Is there a way to build in the "we don't know exactly how runoff/depletions etc. will play out" error when using the model in April, for example, to forecast water temperature through the summer? The team responded that this is a topic related to using model for forecasting purposes, and we will cover in Phase II and requested patience. Currently, our focus is to get the model calibrated so that we can be ready for application and Phase II study.
- A member asked if the WTMP can assess efficiency for both daily maximum and daily minimum, or just daily mean. The team responded that the calibration and statistics are running on an hourly basis, covering daily max, min and mean. The team added that in the past, there were requests for focusing on daily max, min or average only in model calibration; however, these requests all ended with the revised request to have everything on an hourly basis. Therefore, the statistics built on the hourly data would be appropriate and provide needed information for generating information with a different time scale or extremes.
- A member asked about additional clarification using the varied flow amounts in the withdrawal zones in relation to the Shasta Temperature Control Device gates. Mr. Deas expanded on the prior explanation about the modeling approach to include three points of inflow and letting the model decide the proportion of flow distribution. The direct approach using only the flow at the gate does not yield satisfactory results. This method has been implemented in the past and shows good results.
- Mr. Sun asked if the group is interested in having a subgroup focusing on TCD modeling. Some members expressed interest. After some exchange, Mr. Sun stated that we will take this offline for additional survey of interest and if warranted, organization of a subgroup for TCD modeling.

Featured Discussion: Data Acquisition and Database Management

The next discussion by Mr. Deas and Mr. Jeff Schuyler (Eyasco) focused on data inventory table review, data gap discussion, and data management system updates. A draft data inventory table with attributes including location, period, and other information were used in real-time demonstration of the data acquisition challenges.

Questions and Feedback:

- A member asked if the WTMP team is looking for some missing data or data gages, or potentially whole series of data that are not listed such as CDFW's data loggers. The team responded that they have reached out to CDFW and have received information on gage loggers. The team emphasized that sometimes, we may not know certain data exist, or we may have portion of it. Members were encouraged to flag data availability and we will review the data to see if we have it.
- A member asked if model ready data is used for the final model calibration? The team confirmed that model ready data will be used in the final model calibration.
- A member asked the clarification on the practices of getting model data ready on a continued basis. The team responded that after the challenging process of preparing the historical records back to 2000 is completed with this effort, then moving forward the process would be easier to address data issues in a timely manner, resulting in a much less onerous effort. The data management system may also send out an alert if the incoming data has some discrepancy to allow early corrective actions.
- A member asked if the idea that the ongoing up-to-date dataset will be used to support scenario modeling over a growing data history, or will the growing dataset be used to recalibrate the temperature models every few years? The team responded that with the WTMP, one could produce a calibration report as needed. The recalibration is usually in response to certain observed challenges with the current models, critical data coming online, or other reasons. The frequency of recalibration often ties to funding availability, priority, or anticipated effects on the water temperature forecast. The important takeaway is that the WTMP facilitates this function when needed.

Featured Discussion: Habitat Data Subgroup – Discussion and Outcome

The next discussion by Mr. Sun and Ms. Field focused on the reporting out on the discussion and outcomes from the habitat data subgroup, including background of the habitat data use for WTMP, outcomes from the two habitat data subgroup meetings, and next steps to distribute final draft to subgroup members for review. The data includes locations, species, seasons, and other pertinent information to highlight the importance and underlying reasons for interest as related to the WTMP implementation. Per subgroup member's suggestion, we are gathering additional information from literature. After it is completed, the data will be reviewed by subgroup members first before sharing with the entire MTC.

Questions and Feedback:

- Members commented that participating in the habitat data subgroup meetings was a positive experience and thanked the WTMP team for hosting the discussions.

Featured Discussion: American River Water Temperature Model Development

The next discussion by Mr. Craig Addley (Cardno, now part of Stantec) and Mr. DeGeorge introduced the American River water temperature model development and initial model setup. The topics included providing a system overview of Folsom Reservoir and Folsom Dam, Lake Natoma, American River below Nimbus Dam to the confluence with the Sacramento River, and inflow and outflow water temperature and discharge and meteorological data. The discussion also included WTMP representation of boundary conditions, WTMP calibration data and preliminary calibration, and WTMP forecast model components and visualization. The WTMP team requested MTC input on the representation and input for the American River water temperature models. Future meetings will discuss model calibration, model validation, model sensitivity, and documentation.

Questions and Feedback:

- A member asked what data elements were most affected by wind and wind direction? The team answered that wind plays a significant role in energy balance terms controlling heat transfer at the atmosphere and water boundary, and it is represented in the model.
- A member asked if there were still leaks when all the Folsom TCD shutters were lifted. The team responded that there are no leaks with all the shutters lifted. (This was a clarification question for the figure on slide 111 in the presentation.)
- Mr. Sun asked for clarification if the exhibits on model calibration shown in the presentation were results from the current effort since it shows a different period. The team confirmed that the calibration was ongoing, and the exhibits were from previous work and used for concept and discussion purposes only.

Wrap Up and Next Steps

The meeting was concluded with the following next steps.

- TM developed and distribution for review
    - Data management plan
    - Data inventory
- Model development and framework implementation
- Initiation of subgroup discussions
- Next MTC Meeting: Thursday, 7/7/2022; 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
        - Initial discussion for Stanislaus River Water Temperature Model