CVP Water Temperature Modeling Platform, Modeling Technical Committee Meeting #7

Thursday, January 5, 2023; 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 mid-term peer review.
- Provide opportunities for input on interim products and collaboration for three river basin model development.

Agenda

See 20230105 WTMP MTC07_Agenda_Accessibility.pdf

Attendees

See 20230105 WTMP_MTC07_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 on mid-term peer review activities and outcomes. The seventh MTC meeting was conducted in a consistent format as previous MTC meetings. The main topics included summary of the outcomes from the mid-term peer review, continued discussion of development of Stanislaus River Water Temperature Model, feedback on the data development technical memorandum (TM), modeling framework implementation update for framework and data management system, characterization of model uncertainty, and a project presentation on updates to Reclamation's collaboration with the National Center for Atmospheric Research (NCAR) on the Meteorology Forcing datasets/Inflow Temperature Project for the Sacramento/Trinity River System (SacMetTemp Project) supported by Reclamation's Science and Technology Grant. Opportunities were afforded for follow-up questions and exchange of ideas. This 3-hour online meeting was attended by 37 participants among 54 registered. The next MTC meeting is scheduled for 4/6/2023 from 1:00 p.m. – 4:00 p.m.

Meeting Logistics and Welcome Remark

Mr. Yung-Hsin Sun (Sunzi Consulting) started the meeting with a review of the agenda and logistics. Mr. Sun also provided a brief review of 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.

Featured Discussion: Reporting Out Mid-Term Peer Review

Ms. Randi Field (Reclamation) provided an update on the independent scientific peer review process, with the goal of providing 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 a final review is tentatively scheduled for Summer/Fall 2023. The final report of the mid-term review and incidental comments are posted at the DSC site. Ms. Field summarized the initial response to the review panel's findings and recommendations. Many of the findings and recommendations 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 appropriate audience for consideration. The panel commented on the adequacy of the models during dry conditions. To date the modeling team has not observed consistent bias of model performance associated with hydrologic or weather conditions that are significant and warrant a change to the approach of using a single model representation for all hydrologic conditions. The WTMP will incorporate input based on the mid-term review report in the subsequent project development.

Questions and Feedback

- No questions or comments.

Featured Discussion: Stanislaus River Water Temperature Models – Calibration/Validation: Status Update

The next discussion by Mr. Mike Deas (Watercourse) was a status update on the Stanislaus River water temperature model development and initial model setup introduced in the last MTC meeting. 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, developed geometry, and boundary conditions for New Melones, Tulloch, and Goodwin. The next steps include initial model testing and calibration based on existing field data, HEC-5Q model inputs, and Reclamation reservoir operations, USGS stream gage data, and California Irrigation Management Information System (CIMIS) meteorological stations. 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

- A member asked if the model will be able to account for side flows that come in from Tulloch to New Melones. Historically, these side flows have had significant volume at times. However, the member did not know any credible information to use.

    - The team acknowledged the conditions, especially in winter months, but not in dry season when water temperature is more a temperature concern. The team further responded that these side flows are considered in the active boundary condition and the flows can be modeled in the system. These accretions are quantified as specific inputs in the model.

- A member asked how the outlet at original Melones Reservoir is represented in the model. Is this outlet obstructed due to sediment?

    - The team responded that the model would include assumptions regarding the operations of the outlet. This will be a scripted process to allow the model operator to test scenarios with the use of outlet or not. The outlet was used in low storage conditions. In the legacy HEC-5Q logic New Melones uses the old outlet under very low reservoir elevation conditions.

- A member expressed concerns over the fact that due to community preference, Tulloch reservoir operation keeps the water elevation higher than a normal dam.

    - The team acknowledged the described conditions and responded that there is an operation that allows for special drawdown periods in the fall.

- A member commented that there is currently a single water quality gage located at Ripon used for compliance. Will the model be able to trace dissolved oxygen at different locations along the river system?

    - The team responded that ResSim does support dissolved oxygen modeling, citing the Russian River study as an example. However, including dissolved oxygen tracing is outside the current scope of the WTMP process but can be considered as an extension in the future. What has been done so far can be a solid foundation for this future extension if implemented.

- A member commented on the varying widths of model grids for New Melones Lake and suggested modifications for smoother transitions between grid cells.

    - The team responded that the model grids for New Melones are still under review for potential improvement. The configuration of the New Melones Reservoir is challenging for gridding purposes.

Featured Discussion: Feedback on Data Development TM

The next discussion by Mr. Sun reminded the MTC members that comments on the Data Development TM are due on January 30, 2023, and asked for MTC members to make comments in the document and save to Dropbox folder or email comments directly to Mr. Sun or Ms. Field. The TM will be posted on the project website after incorporating comments from MTC members. Mr. Sun then opened the discussion for MTC members to give early feedback or ask questions.

Questions and Feedback

- A member commented that they were having issues accessing the Dropbox via their work computers.

  - The team responded that they would investigate this issue and alternative means for sharing large documents.

- A member asked if the recent 2018 Shasta Dam raise bathymetry data was being incorporated into the model bathymetry.

  - The team responded that the model does not currently have the 2018 data, but the bathymetry data currently in the model is not remarkably different from the 2018 data. The 2018 data was mainly for improving the bathymetry data near the dam.

- A member asked if the model could simulate the Folsom temperature control shutter operations after the ongoing upgrade. In addition, does the model reflect the recent stream restoration efforts in the lower American River?

  - The team responded that the American River models have been used for simulating the shutter upgrade, and the model has the latest topography for the lower American River provided by a consultant of the Water Forum. The model can be set up to test different topography scenarios and temperature results can be comparatively analyzed.

Featured Discussion: Modeling Framework Implementation Update – Part 1: Framework

The next discussion session by Mr. John DeGeorge (RMA) started with an update on the modeling framework implementation. The update includes support for W2 and ResSim modeling, ensemble and position analysis simulation, integration with Data Management System (DMS), and seasonal temperature management plan use case development.

Questions and Feedback

- A member asked if the standard HEC-WAT software is being utilized for the platform and noted the standard HEC-WAT does not have a W2 plugin.

  - The team responded that a version of HEC-WAT different than what is distributed on USACE HEC website (version 1.0) is used and additional Java codes and python scripting for customization are used to enhance the user interface to help with model workflow. A W2 plug-in is used and compatible with this version of HEC-WAT. The team will explore options to share the non-standard HEC-WAT and W2 plugin.

Featured Discussion: Modeling Framework Implementation Update – Part 2: Data Management

The next discussion session by Mr. Deas started with a review of the data processing steps to create boundary condition data. The goal of the DMS is to produce model ready data and calibration/validation data and develop a systematic way to document changes to raw data with the use of metadata as appropriate for documentation. Mr. Deas presented examples of creating a

boundary condition from separate time series and use of quality codes to differentiate between different data series.

Questions and Feedback

- No questions or comments.

Featured Discussion: Characterization of Model Uncertainty

Mr. Deas started the session by stating the objective is to develop and communicate sources of uncertainty in estimates of water temperature downstream of regulating reservoirs. This includes the identification of potential sources of variability and uncertainty within the modeling approach, and the exploration of potential impacts from uncertainty on applications such as forecasting. Mr. Deas proceeded the discussion with an overview of model uncertainty, elaborated details for each major source and its relevancy in the context of the current WTMP project scope and focus, and opened discussion for input from MTC members. The next steps include incorporating input from MTC members, developing a TM, and identifying approaches to explore model uncertainty.

Questions and Feedback

- A member commented that an existing project is underway to rehabilitate the Folsom Dam TCD. The project includes rehabilitating the current structure, but not changing the current temperature management operations.

    - The team confirmed they are aware of this ongoing project. The American River models have been used for evaluating the effects of shutter upgrade.

- A member asked if uncertainty reporting and uncertainty visualization would be a future discussion topic?

    - The team confirmed they are currently exploring options to characterize the uncertainty for promoting adequate understanding of model outputs and make assessments/judgments around uncertainty.

- A member asked if there was a method to set up retroactive uncertainty data.

    - The team responded that this option requires additional thought and consideration in the model uncertainty output.

- Mr. Andy Wood (NCAR) commented the National Weather Service has been reporting on hydrologic forecast and how to communicate uncertainty to stakeholders. He suggested this could be a resource for the WTMP.

    - The team will follow up with Andy Wood for reference links and presentation materials for WTMP.

Featured Discussion: Update on National Center for Atmospheric Research's Meteorology Forcing Datasets/Inflow Temperature Project

The next discussion by Mr. Andy Wood (NCAR) gave an overview of Reclamation's Science and Technology Grant project to evaluate water temperature modeling and prediction in the Sacramento River basin. The SacMetTemp Project focuses on research and a review of the existing sub-seasonal

to seasonal (S2S) climate forecasts datasets used for the Sacramento and Trinity Rivers. The project will examine approaches and explore potential areas for improvement. The project tasks include evaluation of current operational datasets and temperature outlook approach, assessment of new gridded meteorological input datasets, assessment of alternative potential S2S climate forecast approaches, and experimentation with S2S reservoir inflow and inflow temperature predictions using S2S climate forecasts. Planned activities for the next six-months include generating an experimental ResSim and CE-QUAL-W2 meteorological forecast inputs for Sacramento/Trinity modeling and by mid-summer 2023.

Questions and Feedback

- No questions or comments.

Wrap Up and Next Steps

The meeting was concluded with the following next steps.

- Distribute Model Calibration/Validation TM: Sacramento/Trinity River and American River Models

- Continued Stanislaus River model development

- Continued WTMP implementation and testing

- Uncertainty characterization and communication

- Upcoming MTC Meetings and other major project events

  - MTC 08 meeting, Thursday 4/6/2023; 1:00 p.m. – 4:00 p.m.

  - CWEMF Annual Meeting (the session proposal submitted), April 17-19, 2023

  - MTC 09 meeting, Thursday 7/6/2023; 1:00 p.m. – 4:00 p.m.

  - Final scientific peer review hosted by DSC, Summer/Fall 2023 (TBD)

  - MTC 10 meeting, Thursday 10/5/2023; 1:00 p.m. – 4:00 p.m.

  - Project completion, late 2023

- Next MTC Meeting: Thursday, 4/6/2023; 1:00 p.m. – 4:00 p.m.

  - A separate email will be sent out with meeting registration information.

  - Scheduled topics:

    - Stanislaus River model calibration/validation

    - Model uncertainty and communication

    - Framework implementation and model discussion, as needed