Charge to the HEC ResSim Water Temperature Independent Peer Review Panel

Objective

The intent of the review is to constructively inform the U.S. Bureau of Reclamation (Reclamation) with recommendations to improve HEC-ResSim (ResSim) as a reservoir temperature simulation model. Though the use of ResSim for reservoir modeling is well established in the literature, the temperature modeling component was only recently developed. A robust peer review of ResSim for reservoir temperature modeling will be conducted to further the model's acceptance by Reclamation and associated interested parties.

Reclamation has undertaken an effort for a Water Temperature Model Platform (WTMP) Project which entails the collection of data, development of a data management system, development of a set of physically based tools, and development of a modeling framework. A successful application of this platform with ResSim would be capable of providing short and long-term water temperature predictions to assist resource managers of major Central Valley Project reservoirs with balancing water resources and downstream temperature needs. The development effort covers the northern system – Shasta Lake, Keswick Reservoir, Trinity Lake, Lewiston Reservoir, Upper Trinity River, Upper Sacramento River, Whiskeytown Reservoir, and Clear Creek, the American River system – Folsom Lake, Lake Natoma, and Lower American River, and the Stanislaus River system – New Melones, Tulloch, and Goodwin Reservoirs, and Stanislaus River.

Review Panel Membership

The Panel consists of four members whose expertise includes hydrology, modeling, and water quality. The Panel will address questions based on their expertise and are to provide comments solely based on the scientific information being reviewed.

Panel Format

The review panel will convene virtually for 1-4 closed teleconference meetings prior to submitting their Panel Letter (see below) to the Delta Science Program (DSP). Reviewers may hold subsequent virtual meetings as needed during the review period. The DSP will coordinate all correspondence between the reviewers and Reclamation.

Panel Letter

The deliverables of the final review will include a Panel Letter that is developed by the entire Panel and will address the Review Questions based on their expertise. For the letter format, the Panel shall use a Delta Science Program template, and the letter shall contain a concise executive summary and a table of contents if the report exceeds five pages. At the conclusion of receiving peer review comments, the Peer Review Lead will submit a final Peer Review Report to Reclamation's peer review website (http://www.usbr.gov/main/qoi/peeragenda.html), which will include the Panel Letter and list the comments provided by the reviewers. Reclamation's responses to the comments, including actions the

agency will undertake regarding the comment, and reasons the agency believes those actions will satisfy any key concerns or recommendations will be included in the publicly posted materials

Peer Review Materials

Materials consistent with the focus of the peer review will be provided to the Peer Review Panel and are listed below in no specific order.

Review Documents

1. ResSim Water Quality User Manual
2. Technical Reference
3. Sonoma Water Case Study
4. Water temperature model platform (WTMP) Appendix J American System ResSim Results

Supplemental Material (Optional)

1. WTMP Model Documentation
2. WTMP Appendix F Upper Sacramento System ResSim Results
3. WTMP Appendix M Stanislaus System ResSim Results

Summary of Charge

Specific questions are identified below to guide the Panel for the review. The Panel is encouraged to review each question carefully and clarify, refine, or otherwise modify questions as appropriate.

Review Questions

1. Documentation
    a. How can the documentation of the model be more complete, comprehensive, clear, and readily accessible for users?
    b. Does the documentation contain appropriate references?
2. Theoretical Basis
    a. Evaluate the first principles, scientific studies, and empirical measurements used to develop the fundamental components.
3. Review mass balance analysis for each of the test cases.
    a. What criteria have been used to validate the model mass balance?
    b. What types of studies were used to validate the mass balance? What are the spatial and temporal scales? What are the flow regimes?
    c. Are there any evident biases—spatial or temporal—in the model?
4. Review energy balance analysis for each of the test cases.
    a. What criteria have been used to validate the model energy balance?
    b. What types of studies were used to validate the energy balance? What are the spatial and temporal scales? What are the flow regimes?
    c. Are there any evident biases—spatial or temporal—in the model?
5. Case Test Studies
    a. Were case test studies effectively used to validate the model during the development phase, and were they appropriate and thoroughly tested?

b. Was sensitivity analysis included in the case test studies? How does ResSim respond to sensitivity analysis? How could it be improved?

Schedule

Panel Review: commences January 2025.
Final Panel Report: to be completed April 2025.