Proposal number: <u>2001-K219-1</u>   **Short Proposal Title:**   Lower Calaveras River chinook
salmon

and steelhead life history limiting factors
assessment

1a) Are the objectives and hypotheses clearly stated?

Yes, the authors clearly convey the project's objectives and hypotheses. The overall goal of the research, namely to synthesize the various environmental factors limiting chinook salmon and steelhead populations, is of great scientific and practical importance. Scientifically this is a challenging technical task where much progress remains to be made. The practical importance of this research is that the effects of various stressors and of potential management responses will be evaluated on a population-level basis.

The preliminary hypotheses identified in the proposal (e.g., elevated water temperature reduces juvenile salmonid survival) are testable statements of potential factors limiting salmonid success in the Lower Calaveras River, and are consistent with the current state of knowledge regarding juvenile salmonid dynamics.

1b1) Does the conceptual model clearly explain the underlying basis for the proposed work?

The conceptual model outlined in Figure 3 is an excellent basis for the proposed research. This is particularly important given that a critical component of the proposed research is to develop mathematical models or simulations relating juvenile salmonid populations to limiting environmental factors.

1b2) Is the approach well designed and appropriate for meeting the objectives of the project?

The overall approach outlined in the proposal is generally well designed to achieve the stated objectives. The synoptic habitat assessment, even at the coarse level of resolution available from aerial surveys, should provide a useful base for later modeling work. The additional reconnaissance-level field surveys, fish community assessments, temperature monitoring and barrier and entrainment point identification will provide important assessments of the environmental conditions and limiting factors juvenile salmonids face in the Calaveras River.

The plan to conduct mechanistic research during year 2 is necessarily vague as it depends on the results of the reconnaissance-level surveys. I would have liked to have seen some description of experimental designs, however, anticipating the important limiting factors in the Calaveras River. For example, the study design for a mechanistic study focusing on the response of juvenile chinook salmon and steelhead to elevated temperature would have been appropriate as a likely example. I would further encourage the authors to closely think about the population-level processes that these studies would evaluate. Poor growth and low survival are probably the two most critical responses to unfavorable environmental conditions, but movement out of such conditions is an important behavior that individual fish may use to avoid exposure. As such, this may play an important role in the overall growth and survival of a cohort faced with a patchy environment with multiple limiting factors.

The description of the population modeling is not adequate to evaluate its technical merit. The strength of the conceptual model, however, provides an indication that the authors are on the right track. In my own work on similar problems outlined in this proposal, I have generally used individual-based models to represent the dynamics of the system and to accommodate multiple limiting factors.

1c1) Has the applicant justified the selection of research, pilot or demonstration project, or a full-scale implementation project?

The work outlined clearly falls into the research project category based on the nature of the study proposed (i.e., data collection and modeling).

1c2) Is the project likely to generate information that can be used to inform future decision making?

This project has a high likelihood of generating essential information for making management decisions. Being able to incorporate and assess the numerous factors limiting salmonid populations into a single cohesive analysis is a critical need for resource managers. Further, this approach should readily fit within an adaptive management framework. As management actions reduce some of the limitations faced by juvenile salmonids (e.g., increased spawning gravel), this will extend the range of data available to the model, thereby providing a mechanism for a positive feedback loop whereby the model is improved and additional management options become apparent.

2a) Are the monitoring and information assessment plans adequate to assess the outcome of the project?

The work proposed is largely monitoring and assessment, and as such provides an adequate plan for these activities.

2b) Are data collection, data management, data analysis, and reporting plans well-described, scientifically sound and adequate to meet the proposed objectives?

The data collection techniques are reasonably well described. More details would have been helpful in assessing their adequacy, however. The data management process also appears reasonable, although I would strongly encourage the investigators to develop a relational database to maintain data integrity and facilitate reporting. The data reporting plan is not clearly described.

3) Is the proposed work likely to be technically feasible?

The methods for data acquisition are largely based on existing data or are data to be collected with standard methods. As such, the work planned is very feasible. The modeling work should be technically feasible, although some approaches (e.g., individual-based modeling) may require computational approximations to make them feasible.

4) Is the proposed project team qualified to efficiently and effectively implement the proposed project?

The project team appears well qualified to conduct the field-oriented aspects of this project. I did not see clear evidence, however, that the team has the requisite knowledge or experience to develop the models necessary to synthesize the impact of multiple limiting factors on salmonid populations.

Miscellaneous comments

Overall Evaluation Summary Rating	Provide a brief explanation of your summary rating
☐ Excellent	While the proposed research lacks some details that will be important to the overall success of

X	Very Good	the project, I've given this project a relatively high rating because of its scientific importance
☐	Good	as well as the thorough coverage of the conceptual basis for the project and the clear
☐	Fair	identification of an approach to tackling the challenging problems that are likely to arise.
☐	Poor	