

Draft Individual Review Form

Proposal number: 2001-K205-3 Short Proposal Title: Intragravel conditions & salmonid egg survival

1a) Are the objectives and hypotheses clearly stated?

Yes. The objectives and hypotheses are clearly stated.

The objectives of the study are to determine the following: whether discharge or fine sediment influences intragravel flow direction or magnitude; whether intragravel flow direction and magnitude influence salmonid egg survival; whether the intragravel water temperatures affect egg survival (Sacramento River vs. Deer Creek environs) and, lastly, whether the lower fine sediment loads of the Sacramento River result in higher egg survival vs the higher sediment loads presumed to occur in the Deer Creek watershed.

The Hypotheses are:

- (1) intragravel flow direction and magnitude differ with different discharge regimes and fine sediment load*
- (2) intragravel flow and direction influence salmonid egg survival*
- (3) intragravel water temperatures in the Sacramento River are lower and result in higher egg survival than in Deer Creek for the same time period, and*
- (4) the fine sediment load of the Sacramento River is lower, which results in higher egg survival than in Deer Creek where sediment loads are presumed to be higher.*

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

Yes. The conceptual model suggests that human manipulations of a river's discharge regime, thermal regime or fine sediment load (e.g., through dam operations or land use practices) can alter the intragravel environment of incubating eggs in such a way that survival and fitness of anadromous salmonids is directly influenced. The model further suggests that a clearer picture of how these changes influence salmonid survival will address not only a major uncertainty in ecosystem management (i.e., what influence does dam operations have on intragravel conditions), but also provide a scientific basis for managing dam operations to provide intragravel conditions that enhance rather than hinder salmonid survival.

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

Yes, with the exception of hypothesis (4), for which (as written) no test is provided.

Hypothesis (4) assumes that the percentage of fine sediment present in the Sacramento River is lower than in Deer Creek and, thus, that egg and embryo survival will be higher in the Sacramento River. This is certainly possible, and definitely testable. But in order to do so the investigators are going to have to do more than sample the post-spawning particle size distribution of salmon redds from each stream. As proposed, the distribution data collected will be of post-spawning conditions as modified first by the female salmon during construction and cleansing of the substrate (particularly of fine sediment), then later by natural events that mobilize and deposit fine sediment in the redd after nest building is complete. There's no mention of characterizing initial substrate conditions in either of the two study streams, which is at least one prerequisite for testing the first part of the assumption that the sediment load of the Sacramento River is lower than in Deer Creek.

I'm willing to assume that the project proponent doesn't really want to test whether the fine sediment load is higher on one stream versus another. But rather, they really want to test the influence of fines on survival. If my assumption is correct, hypothesis (4) should be rewritten to read something like: lower percentages of fine sediment results in higher egg and embryo survival. This hypothesis can be tested locally with pre- and post spawning substrate samples, can be further evaluated in the laboratory model, and the conditions of one

stream reasonably compared to the other. All of which would provide valuable data on the direct relationship between substrate size and salmonid egg and embryo survival

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

Yes. The applicant has appropriately identified the proposed work as a research project. The intragravel environment (hyporheic zone) is the location of all anadromous salmonid egg deposition. It provides dissolved oxygen, temperature and the water quality environment necessary for the survival of salmonid eggs and alevins. Yet we have a poor understanding of this zone, its effects on early life stage survival, and whether or how the zone might be managed. A pilot or implementation project would be inappropriate before developing an understanding of how conditions in the intragravel environments influence egg and embryo survival and how these factors might be remediated or actively managed.

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

Yes. The intention of this research is to obtain data that will provide a scientific basis for modifying dam operations and/or more effectively managing dam releases and temperature regimes to improve and enhance salmon egg and embryo survival.

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

Yes.

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

Yes, with the exception noted above in section 1b2).

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

Yes. The proposed field and laboratory elements of the proposed work are technically feasible.

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

Yes, with the possible exception as noted above in section 1b2).

If the project proponent really wants to test hypothesis (4) as currently written, they and the proposed research would benefit from the addition of an investigator with a background in substrate sampling (perhaps a geologist or fluvial geomorphologist).

Otherwise, the principle investigator has successfully implemented various technically and logistically difficult elements of the field component (on the aforementioned Deer Creek as well as in Oregon and Washington). This experience will inform the research proposed here, and suggests that it will be successfully completed as described

I believe the laboratory model is appropriately included in the proposed research, and should help to address and/or refine the “noise” that invariably occurs in the measurement of field variables. The proposed laboratory model will provide for the systematic study of intragravel water movement in a controlled environment, make for statistically more robust analyses of the data collected, and allow for improved interpretation of field data.

Overall Evaluation Summary Rating

GOOD

Provide a brief explanation of your summary rating

With the exception as noted above in section 1b2, I would have rated this proposal as very good. However, because there is no test of hypothesis (4) I felt compelled to lower this rating GOOD.