Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Survival in Sacramento River and Delta Reaches

#0074

Technical Panel Review

Proposal Name: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Survival in Sacramento River and Delta Reaches

Applicant Organization: Pacific Northwest National Laboratory

Principal Lead Investigator(s):
Johnson, Robert
Ploskey, Gene

Amount Requested: $4,822,910

TSP Panel Summary of Findings:

This proposal involves a well-qualified research team which would utilize novel technology. Their general approach has the potential to be very valuable, and the feasibility for this project is high because it has been tried successfully. However, there were significant concerns that prevented the panel from giving this proposal a higher rating. The budget for project is a major concern of the panel since it would overwhelm the total allowed for the entire PSP. This budget would be better expanded for a decade of monitoring and considered at a higher level for this scale of funding. This kind of empirical overload would be well-suited to testing hypotheses and implementing predictions. Bay-Delta science is not at this stage. There was an abundance of details on the technology that would be employed, but less details on the actual applied research (e.g., they will focus on "2 of 4" distinct runs of Chinook, but don't specify which two). They suggest that they will evaluate many hypotheses, but the panel questioned how the project team would fully answer all of them; how will they be able to evaluate all hypotheses given they are limited to 2,000 fish/yr split between 2 distinct runs?

The panel determined that this has the potential to be a relavent topic, but the proposal did not meet the objectives of this PSP. More specifically, although salmon and their behavior are a relevant topic for CALFED, the questions that

this project is attempting to address are not very relevant, which reduced the panel's overall relevancy rating. When evaluating a proposal, the Science Program is looking for complete scientific package that includes a clear and relevant question, articulation of a conceptual model that describes the current state of knowledge and expressly links ecosystem drivers with the outcomes of interest, a stated hypothesis informed by the conceptual model, a study design drawn directly from the conceptual model and concluding with how the study results will address the original question.

In the panel's opinion, this project team spent too much time focusing on the technology that would be used in the project, but did not clearly define the study design and fundamental questions they wanted to answer. This was compounded by the extremely high budget, which the panel did not believe has a high cost−to−value ratio. If the project team submits this proposal again, it should demonstrate (among other things) richer hypothesis testing; confirmation of theoretical predictions; and time series analysis at the daily, and weekly time scales for scaling a decade of natural variability.

Relevance to PSP Topic Areas:

Moderate

TSP Technical Rating:
Sufficient

TSP Funding Recommendation:
Do Not Fund

TSP Amount Recommended: $**0**

Conditions:

External Technical Review #1

Proposal Title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Survival in Sacramento River and Delta Reaches

Proposal Number: 0074

Proposal Applicant: Pacific Northwest National Laboratory

Purpose

Comments	**The goals, objectives and hypotheses are clearly stated and consistent within the proposal. This work would be important as a continuation of previous research efforts (Vogel, Horn and Blake, etc.) to enhance understanding of juvenile salmon migration and survival, as well as improve understanding of movement near the Delta Cross Channel. The research would focus on filling in some of the gaps left from previous efforts. The selection of research is justified and will likely add to the base of knowledge about juvenile migration. Being able to assess reaches of the Delta and Sacramento River that are reducing survival will help target restoration and management efforts. Additional research on movement patterns in the Delta Cross Channel area will also improve understanding on how water management and environmental conditions affect movement. The project will not likely generate novel methodology or approaches.**
Rating	**Above Average**

Background

Comments	**There is no conceptual model stated. Information to understand the basis for the proposed work is in the proposal and is well documented.**
Rating	**Sufficient**

Approach

Comments	The approach is well designed for meeting the objectives of the project, however details for the experimental design are lacking. Management and administration tasks are clear and resources are set aside to do so. Products are likely of value, dissemination of information will be via reports, conference presentations and manuscript for journal. Contributions to larger data management were not considered in the proposal.
Rating	Sufficient

Feasibility

Comments	The approach is technically feasible, but not clearly documented. The technological aspects of the acoustic telemetry system in the proposal were detailed, but the actual experimental design and how hypotheses would be tested was extremely vague (there was one paragraph in the overview where they mentioned the release of 2000 fish). However, the team of researchers is extremely qualified and could likely conduct the research, but the plan simply wasn't written clearly into the proposal. The scale is consistent with the objectives and within the grasp of the project team.
Rating	Sufficient

Budget

Comments	The budget is huge, and several aspects of the budget are not explained. Equipment totals over $2 million of the budget, but details of what equipment will be purchased are not mentioned (other than some description in the proposal text). Similarly, "subcontractor" accounts for a portion of the budget, but only one part of the proposal (personal) mentions a subcontractor. The responsibilities part of the personnel section states, "directs fish work". The

	cost of this telemetry technology for fish tracking is no doubt expensive, but it is difficult to say whether the budget is reasonable when it is so vague. Overall, $4.8 million is a substantial sum of money, and the project will answer a few questions. Perhaps if the technology is so expensive to deploy and manage, investigators could try to address more questions while conducting the experiment. Possibly tagging wild fish in addition to the hatchery fish would be an additional test to conduct. Perhaps more survival gates could be placed to assess, with more precision, problematic areas for survival. As there is no detail of budget costs, it is difficult to know whether this would be possible.
Rating	Sufficient

Relevance To CALFED

Comments	The proposal does address three of the four priorities stated in the PSP and the modeling aspect of the project is also well suited to CalFed's goals. Information will likely be very useful for those attempting to better manage water operations for improved survival of delta smelt.
Rating	Above Average

Qualifications

Comments	The investigators involved in this research are extremely qualified, having conducted several tracking and survival experiments using this acoustic technology. Several investigators have published in peer reviewed journals on similar research projects in other river systems.
Rating	Superior

Overall Evaluation Summary Rating

Comments	The idea behind this research is compelling. If managers hope to improve conditions for delta smelt, key information about juvenile survival during migration, as it relates to environmental conditions and water operations, will be extremely important. Additionally, the team of investigators has demonstrated that they are extremely qualified to conduct this type of research through their publication history and past research efforts. However, this proposal itself was lacking in details, particularly in the experimental design, making it difficult to assess how the hypotheses would be tested. The budget was also somewhat vague making it difficult to assess the value.
Rating	Above Average

External Technical Review #2

Proposal Title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Survival in Sacramento River and Delta Reaches

Proposal Number: 0074

Proposal Applicant: Pacific Northwest National Laboratory

Purpose

Comments	The project goals, objectives, and hypotheses are clearly stated and consistent. The application of impressive new acoustic telemetry system may challenge current understanding about Chinook emigration near the Delta Cross Channel (DCC), Georgiana Slough (GS), and lower Sacramento River. Smolt losses due to Sacramento River diversions and delta water operations are chronic fishery management issues that would certainly benefit from additional study. Fall run hatchery fish may be appropriate surrogates but the emigration timing of more sensitive populations should be considered.
Rating	Above Average

Background

Comments	The literature review makes a case for additional DCC and GS study but the proposal lacks detail about water operations and how the release strategy would answer specific operational questions. However, the telemetry system’s power to reveal detailed patterns of emigration behavior and improve survival estimates justifies the investigation.
Rating	Sufficient

Approach

Comments	The accurate positioning capabilities of JSATS will encourage formation of new hypotheses about juvenile Chinook movement in the delta. The emphasis on fish movement near DCC and GS is acknowledged in the proposal. Information to support the study of other reaches is lacking. Testing hypotheses 9–12 seems reasonable but would require unidentified efforts of other researchers to provide environmental data (hydraulics and water quality). Reports and likely peer reviewed journal articles will enhance knowledge about DCC, GS and should suggest ways to improve survival in the study reaches. The Tag Viz data visualization program is an interesting product that may be an effective way to illustrate trends to managers and other researchers. As I mentioned above, the full potential of this effort relies on unspecified work by other organizations to provide hydraulic and water quality data. How this tagging study will integrate these other efforts needs further explanation. The CALFED science program could benefit from development of a coordinated interagency biotelemetry monitoring system in the Delta and Central Valley. Will the Fish and Wildlife Service retain the hydrophones and associated equipment when the study is completed? Is the system commercially available? Could this application of JSATS serve as a model for investigations by other groups in the Central Valley?
Rating	Above Average

Feasibility

Comments	The documentation of technical feasibility is this proposal’s greatest strength. The JSATS has been tested extensively and used successfully in the Columbia River basin. The first year of study would be dedicated to comprehensive testing of acoustic array

	performance. There is little doubt the study will generate detailed behavioral data and precise survival estimates.
Rating	Superior

Budget

Comments	The budget is detailed and clearly identifies task, salaries, and equipment. This is an expensive effort that will cost nearly 5 million dollars for 3-years. The personnel costs seem reasonable but the equipment is very expensive. That level of research funding should be justified by continued use of the purchased equipment for additional years of study. If hydraulic and water quality monitoring efforts in the study reaches are insufficient to support the telemetry research, will additional expenditures (e.g., ADCP) be required?
Rating	Sufficient

Relevance To CALFED

Comments	The proposal generally supports CALFED goals and directly addresses water opartions sites of concern identified in previous studies. The project will provide value information to improve survival of at-risk species and effectively manage water supplies.
Rating	Above Average

Qualifications

Comments	The project team is exceptionally qualified to conduct the study. The applicants developed the technology and have extensive experience investigating juvenile salmonid behavior, fish passage, and survival in the Columbia River basin. The lead scientists are well known professionals and have published extensively in peer-reviewed journals.
Rating	

	Superior

Overall Evaluation Summary Rating

Comments	The proposed study tests interesting hypotheses, applies exciting new technology, employs a highly qualified research team, and could substantially elevate current understanding about juvenile Chinook outmigration in the Delta. The proposal could benefit from more information about the study reaches beyond DCC and GS, how tagged fish releases will be coordinated with DCC gate operations, and how the project will coordinate with water quality and hydraulic investigations outside the scope of the proposed project Telemetry studies of juvenile salmonids are typically constrained by tag size, operational life, signal encoding, and detection efficiency. The JSATS 0.65 g transmitter is a significant acoustic telemetry advancement. While other manufacturers are producing new systems that have performance capabilities similar to JSATS (CDMA encoded tags, autonomous wireless hydrophones, 3D positioning, 200 + m detection ranges) none are as well suited to the study of small juvenile Chinook. The array configuration and optimization procedures are also impressive. The project team’s experience and capabilities can greatly elevate the sophistication of smolt research in the Delta.
Rating	Above Average

External Technical Review #3

Proposal Title: Movements of Juvenile Chinook Salmon at Entrances to the Delta Cross Channel and Georgiana Slough and Survival in Sacramento River and Delta Reaches

Proposal Number: 0074

Proposal Applicant: Pacific Northwest National Laboratory

Purpose

Comments	**Hypotheses, goals, and objectives are clear and consistent. The motivation for the research is timely and important to understanding the effects of water management on smolt behavior and survival. It appears well-justified based on existing knowledge. The phased approach looks good based on existing studies in the Sacramento and Columbia, and results should be useful to managers. While the methods are not novel, the information generated will be both novel and useful.**
Rating	**Superior**

Background

Comments	**Conceptual model is well stated and provides good justification for the work. Background information is well-documented and easy to understand.**
Rating	**Above Average**

Approach

Comments	**The approach appears well designed and is appropriate for the objectives. Project management is clear, and the budget is adequate for same. Products will likely be of value to water and fishery resource managers. Plans for publication/dissemination are adequate. Contributions to data management systems are not relevant, but data access (password-protected web site) will be useful for others interested in the**

	analysis.
Rating	Superior

Feasibility

Comments	The approaches for field work and data analysis are well documented and feasible, having been applied in the Columbia in the past. Likelihood of success is high, and project scale is consistent with objectives and resources.
Rating	Above Average

Budget

Comments	Budget is clear and reasonable for the work.
Rating	Above Average

Relevance To CALFED

Comments	The project addresses CALFED water and fishery management questions, and promises to be very informative as the effects of diversion operations on listed fish behavior and survival. It should prove useful to managers.
Rating	Superior

Qualifications

Comments	The qualifications and track records of the authors are excellent, and infrastructure and support appear more than sufficient to accomplish their objectives.
Rating	Superior

Overall Evaluation Summary Rating

Comments	The project overall is well thought out, and results should prove useful to resource managers, as well as informing future research.

External Technical Review #3

Rating	**Superior**