Selection Panel Review Summary

Proposal No.: 001
Proposal Title: Development of a Spatially Explicit Ecosystem Model to Explore Physicochemical Drivers of Step Changes in POD Species and Distribution in the Sacramento-San Joaquin Delta and Suisun Bay
Principal Investigator: Larry Brown, USGS
Amount Requested: $356,483
Recommended Amount: $356,483

Summary: The purpose of this proposed work is to improve a dynamic food web model of the Sacramento-San Joaquin Delta and Suisun Bay to move from using it as a hypothesis-exploration tool towards using it as a decision-support tool for resources management. The major objective is to develop a spatial ecosystem model that can be used to explore physicochemical factors that may have driven spatial shifts in habitat and resultant shifts in abundance for key Delta species, specifically the Pelagic Organism Decline (POD) fishes. The model will allow explicit modeling of habitat impacts on the food web and species abundance and distribution. The proposed work will seek to simultaneously examine the effects of multiple potential drivers on one or more POD fishes and place these patterns in the larger context of estuarine degradation. The work also plans to improve the ability of the model to account for uncertainty in parameter estimates through Monte Carlo simulations to allow managers to better understand the levels of risk associated with different management scenarios.

Assessment: The proposed modeling is very relevant to priorities and issues in the Delta (e.g., food web process, native fish ecology). The proposal is well designed, conceptually strong, and is a much needed effort that expands on existing modeling. The Principal Investigators responded to past comments (from the Delta Science PSP) by considering integration of other factors in the modeling effort if the data are appropriate and indicated they would participate in any independent review if requested. The Principal Investigators are well qualified to carry out this work and are building upon prior work. The overall budget seems reasonable and includes cost share.

2010 Final Review Panel – Summary of Review

Proposal # 19

Proposal Title: Development of spatially explicit ecosystem model to explore drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta & Suisun Bay.

Lead Primary Investigator: Larry Brown

Applicant Organization: U.S. Geological Survey

Amount Requested: $356,483

Panel Findings:

Relevance to Topic Areas: This proposal addresses food web issues in Delta using EwE modeling and will extend a previous modeling effort to produce a spatially explicit EwE model and develop of a decision support tool that also incorporates uncertainty. The panel thought that the proposal was well linked to both food web processes and native fish ecology of the PSP

Quality of the Proposed Research: The conceptual underpinnings of the proposal were good, however, the panel also agreed that there were shortcomings in the research. First, the panel felt that as a "proof of concept", output from the original model or publications based on the model should have been included/referenced in the proposal. In addition, the source code for Ecospace is complicated and difficult to use, and the Panel was concerned that incorporation of Ecospace in the existing model would be much more difficult than the PI's have described. This lack influenced the Panel's confidence in the PI's ability to complete the tasks described in the proposal. The panel also felt that the proposal did not flow well and the role of Townsend was unclear. Finally, there are a variety of models that have been developed for physical and biological processes in the Delta and there was no discussion or linkages of the proposed model with these models.

Main Summary Comments of Reviewers: The external reviewers rated the proposal as above average and superior, but the panel was concerned by a lack of critical assessment of the project within the reviews.

Funding Category: Above Average

Proposal Number:	0019
Proposal Title:	Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay
Proposal Applicant:	US Geological Survey
Amount Requested:	$356,483
Primary Investigator:	Larry R. Brown, USGS

FRP primary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	The propose of the proposed project is clear. Expand on the Ecopath and Ecosim models that already exist by making them spatially-explicit with an Ecospace version, and to add Monte Carlo capabilities to the Ecosim version make it a decision support tool. The new version will then be used to examine the effects of decreased primary productivity, expanded SAV, and invasive species (Corbula and Limnoithona) on the POD species and the food web. The Monte Carlo capabilities will be used for decision analysis.
Background/Conceptual Models	The description of the background is sufficient but too limited. The reasons for doing the modeling are justified by the POD and the need for an ecosystem approach that accounts for foodweb interactions, which is fine. It gets thinner as the authors discuss the factors they will examine. For example there is no mention of contaminants, yet, these are a major focus in the POD. Finally, the major missing aspect is the progress to date using the existing Ecopath and Ecosim versions. The authors base this proposal on expanding the existing models. But they do not present any output of the existing models nor do they describe them in any detail. They say they have spent two years on developing the existing models, and have completed initial runs of the Ecosim version. CVs cite two papers as in prep, and I could not find the Townsend presentation at the 2009 Ecoapth with Ecosim conference, which is on Townsend's CV. Where is evidence of these results? This is important because if the authors want funds to continue this effort and then they should then show the progress made to date.

Approach	The description of the approach is weak and vague. The authors justify needing a spatially-explicit version because of the role of habitat shifts (I agree) and a spatially-explicit version would make simulating certain hypothesis easier (e.g., pumping is local). However, they also justify it because it somehow makes simulating certain hypothesis easier than in a one-box, which I do not follow. With Ecosim they must using driving variables to simulate the effects (e.g., reduced chlorophyll). I do not see how a spatially-explicit version helps with this problem. The authors do not provide much information on the spatial version: what are the spatial boxes, how will they know how to relate habitat in each box to process rates, will they use the default movement in Ecospace (which is very specific and has problems), what years will be simulated and how specific will the simulations be of historical conditions, and a listing of how each POD factor will be represented in the model simulations. There is not discussion of how the model will be fit to data, especially the spatial-aspects. I would have expected the proposal to have a very clear plan. Given the proposal that is expanding existing models, surprisingly little information is provided on the progress to date and the plan for going to Ecospace.
Feasibility	I have mixed opinions about the feasibility. On one hand, the authors have an existing model and if we go along with the vague descriptions, assume the existing models are good, and assume they have a plan in mind, then it is likely they can be successful. One the other hand, the proposal is not very well written, almost as if they rushed to put it together or did not effectively communicate in the preparation phase. For example, they include Figure 1, which is pretty uninformative, and then never discuss it. More importantly, they cite Ecospace as if it was as easy to use as Ecopath, which it is not. While Ecopath and Ecosim have been widely used; Ecospace has only been used in a few places and mostly always with the developer (Walters) involved. The code is tricky and it is not plug-and-play like Ecopath. For example, they do not cite a recent paper about Ecospace but rather only cite a 1999 paper that is very outdated. The authors also want to use Ecosim as a decision support tool, which seems very optimistic, and other than saying that as if they felt they needed to justify the modeling more, they have no clear mechanism for doing this.
Relevance	The proposed modeling is very relevant to the priorities and to issues in the Delta. Indeed, such modeling is desperately needed.
Qualifications	On an individual-basis and viewed in isolation, the authors are well qualified for the project. However, if

Summary Comments	the proposal is an indication, I have concerns about their ability to communicate effectively with each other, especially since they are located in different places. Also, Brown and Townsend seem very busy and I have some concerns about how much time they can devote to the details. Bauer's situation was confusing -she is employee of USGS and a Master's graduate student, but her CV says MS degree in 2010. She will clearly do the work, but developing a spatially-explicit version will be tricky and difficult and the success of the project lies in how well the details are dealt with. This is a very good idea but packaged in a weak and poorly written proposal. I wanted to like this because a spatially-explicit food web model is needed. But the proposal, as stand-alone document, is not convincing. When I factor in the people and past track record, I am more optimistic they have made progress to date (just not shown) and have a plan to go forward (just not stated). Such modeling is needed and I wanted to like this proposal but it does not review well as a stand-alone document. Sufficient (higher if the authors are first required to document their progress to date and specify a very detailed plan for model development and simulations).

Please identify your overall ranking for this proposal:

– Superior
– Above Average
X Sufficient
– Inadequate

FRP Member's Observations Of External Technical Reviewers' Performance On Review Of Proposal:

Along with your written observations, please **rate the collective performance** of the external reviewers of this proposal utilizing the criteria below. Please also provide a **brief summary** in the comment box below.

– Superior
– Good
X Fair
– Poor

Comments:
The reviews mostly repeated what was said in the proposal.

Select "Update" after you make changes you wish to save.

Proposal Number:	0019
Proposal Title:	Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay
Proposal Applicant:	US Geological Survey
Amount Requested:	$356,483
Primary Investigator:	Larry R. Brown, USGS

FRP secondary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	The project goal is to expand upon a previous modeling effort using the suite of ecosystem modeling software known as ECOPATH by incorporating ECOSIM and ECOSPACE into their efforts. The goal is to provide a more dynamic and robust series of ecosystem based models to try to understand key drivers of ecosystem dynamics of POD species.
Background/Conceptual Models	The rationale and background information is clearly stated and complete within the proposal. Limitations of the previous effort are stated along with hypotheses related to the proposed new set of models to be developed.
Approach	The approach is fairly straightforward and except for a few explicit details that remain unknown such as spawning site of delta smelt and lack of understanding of the drivers for habitat preference for smelt, there is a vast amount of background data on this system. The PIs seem a little over-focused on salinity as a physico- chemical driver of patterns in the Delta. I know it is important but not exclusively. Salinity basically changes the size of the container (i.e estuarine low salinity habitat) as river flow changes and it can affect turbidity dynamics and distribution of organisms but so does temperature and primary productivity. As they begin to make this model more dynamic I hope they won't underestimate the importance of other drivers of overall system dynamics. Review of concepts

	and details used in the model are also important and I would have liked more detail on that process. It would improve transparency of the process if some sort of external review was scheduled at some point during the development of the project with some outside reviewers. This is an agency project with an agency review process defined within the project. An external review would improve both the credibility and the transparency of this effort. I would also like to know how this effort fits into or compliments other ongoing or past efforts at modeling dynamics of the Delta.
Feasibility	The project is highly feasible. As one reviewer point out the effort will probably not identify novel processes or insights but it can provide insights into how these processes interact and might react to management actions.
Relevance	Refinements to a previously funded effort to understand Delta dynamics is obviously relevant and potentially urgent if it is ultimately useful to management decision making.
Qualifications	The team is qualified. Brown is a leading Delta expert. Dr. Townsend obviously brings strength and breadth in ecosystem modeling to this project but his role is not as well spelled out as I would have liked since Ms. Bauer's experience is not as broad.
Summary Comments	This project is likely to be successful in developing the models. The real question can only be answered after they are fully developed and that is how well will they mimic processes within the delta and provide a better understanding of the drivers of declining fish populations in the delta. No mention is made of many other modeling efforts under way or planned in the delta and I believe that they should have been acknowledged in this proposal, especially because they might provide valuable insights for the development and execution of this project.

Please identify your overall ranking for this proposal:

- Superior
x Above Average
- Sufficient
- Inadequate

FRP Member's Observations Of External Technical Reviewers' Performance On Review Of Proposal:

Along with your written observations, please **rate the collective performance** of the external reviewers of this proposal utilizing the criteria below. Please also provide a **brief summary** in the comment box below.

– Superior
– Good
X Fair
– Poor

Comments:
Reviewers unanimously supported this modeling effort with very little critical feedback.

Select "Update" after you make changes you wish to save.

Proposal Number:	0019
Proposal Title:	Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay
Proposal Applicant:	US Geological Survey
Amount Requested:	$356,483
Primary Investigator:	Larry R. Brown, USGS

FRP secondary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	The purpose of this proposal is to expand previous EwE modeling to include spatially explicit coverage of physico-chemical factors affecting the POD.
Background/Conceptual Models	The conceptual model is clear and well supported. The PI's have a clear understanding of the dynamics of this system as well as the shortcomings of previous research.
Approach	The approach is appropriate for the task at hand and well detailed. This really is a refinement of previous work, so it is clear that the methodologies are appropriate.
Feasibility	High probability of success.
Relevance	High relevance to multiple aspects of the PSP.
Qualifications	The PI's are well qualified.
Summary Comments	I wish we had more proposals of this quality.

Please identify your overall ranking for this proposal:

x Superior
– Above Average
– Sufficient
– Inadequate

FRP Member's Observations Of External Technical Reviewers' Performance On Review Of Proposal:

Along with your written observations, please **rate the collective performance** of the external reviewers of this proposal utilizing the criteria below. Please also provide a **brief summary** in the comment box below.

X Superior
– Good
– Fair
– Poor

Comments:
Both reviews were detailed, insightful, and well-reasoned. Both reached similar conclusions regarding the high quality of this proposal

Select "Update" after you make changes you wish to save.

External Review, Form #40, of Proposal #0019: Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay

Proposal Title: Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay

Proposal Number: 0019

Proposal Applicant: US Geological Survey

The reviewer has made no 'accept comment' about whether or why (s)he will Review this Proposal.

Project

comments	The goals of the project are to expand and refine an existing model to identify processes and relationships within the Sacramento-San Joaquin Delta and Suisun Bay and to support decision making and determine likely outcomes from different management approaches. Uncertainty is incorporated into the model using a Monte-Carlo approach. The ideas proposed by the authors appear feasible and internally consistent and are supported by prior work. Although it is unlikely that novel ecological or ecosystem processes will be identified, it will provide new insights on how these processes interact and predict impacts of proposed management decisions on the Bay ecosystem. A complex, ecosystem-based approach to decision support is novel and timely.
rating	Above Average

Background

comments	The conceptual model is clearly stated and illustrated in the proposal. The basis of the proposed work is thoroughly presented. The model is built upon prior, successful modeling work in the system, and key uncertainties are identified. The method of integration of the EwE model with Durand model is described and the conceptual basis of this integration clearly presented.
rating	Superior

Approach

comments	The approach appears well designed, and the roles of the P.I.s are clearly stated. Products of value for decision support are likely, though by no means guaranteed, given the uncertainty inherent in these types of modeling efforts. By comparing model results with empirical observations of the system, they will be able to test certain hypotheses regarding major drivers of system changes. PIs plan to disseminate information using typical academic outlets and communication with system managers, which is sufficient.
rating	Above Average

Feasibility

comments	This project's methodology is not untested in previous work and appears technically feasible and has a high likelihood of success. It is a extension of the current Delta Ecopath model, which means that the work will build on existing an ongoing efforts. Regular communication is planned among contributors. The work falls within the specialization of the investigators.
rating	Above Average

Relevance To The Delta Science Program

comments	The decision support and hypothesis testing components of this work address identified priorities. The research direction, in particular, follows Topic 2 - Food Webs of Key Delta Species and their Relationship to Water Quality and other Drivers. Emphasis on drivers of production, in particular, address the priorities identified in PSP.
rating	Superior

Qualifications

comments	The work falls within the specialization of the investigators. The participation of Marissa Bauer is particularly critical, given her specialization on ecosystem modeling. Dr. Brown counters the relatively short track record of Ms. Bauer with extensive experience in the region and insight to the ecology of fishes within the system. Dr. Townsend brings a strong basis in quantitative and ecosystem modeling.
rating	Above Average

Overall Evaluation Summary Rating

comments	This work, in building upon existing models of the region, is both feasible and a logical extension of the current understanding of the system. It uses proven modeling techniques, including approaches to incorporate uncertainty. The spatially explicit nature of the project suggests that 'formulaic' management directions with low likelihood of success are an unlikely outcome.
rating	Above Average

External Review, Form #40, of Proposal #0019: Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay

Proposal Title: Development of a spatially explicit ecosystem model to explore physicochemical drivers of step changes in POD species abundance and distribution in the Sacramento-San Joaquin Delta and Suisun Bay

Proposal Number: 0019

Proposal Applicant: US Geological Survey

Project

comments	This project appears to represent an excellent opportunity to build upon decades of development in the EwE suite of models, as well as previous modeling work using EwE models focused specifically on the Sacramento-San Joaquin Delta/Suison Bay region. Goals, objectives and hypotheses are clearly stated and internally consistent. The idea is timely and important, especially given declines in native pelagic species and observed shifts in vegetation. The results have a high likelihood of adding to the base of knowledge. The project will generate novel info and methodology in the form of the new spatial model, which can be developed further and used for years to come.
rating	Superior

Background

comments	Conceptual model is clearly stated and explains the basis for the work. All info for understanding the work is included and well documented.
rating	Superior

Approach

comments	The approach is well designed and appropriate. It is clear who will be doing what. The products are likely to be valuable. I do not see a plan for widespread dissemination, but I do see mention in several places that the authors intend for this work to be used by managers. Since both the USGS and BOR have regional management responsibilities and since both are most likely closely connected to other management experts and agencies at

	numerous levels, I believe there is a high probability that widespread and effective dissemination will occur.
rating	Above Average

Feasibility

comments	The approach is fully documented and feasible. The likelihood of success seems very high. I wonder if these PIs have collaborated in the past. A track record of that kind of collaboration would be a strong asset, and would eliminate what is one of the only potential weaknesses in the proposal. The scale appears to be consistent with objectives and the abilities of authors.
rating	Superior

Relevance To The Delta Science Program

comments	It clearly addresses the call for work on food webs of key Delta species and their relationship to WQ and other drivers. It strongly addresses other priorities such as integration, synthesis, use of existing info, modeling collaborations. It is not strong on inclusion of multiple disciplines, since all the principal members are biologists.
rating	Above Average

Qualifications

comments	Dr. Brown's track record as a fisheries biologist in CA is extremely strong. He strikes me, in fact, as the pillar in this project, which could create a certain kind of vulnerability to the project. The project team seems very well suited to implement the project, and it appears they have the infrastructure and other support.
rating	Superior

Overall Evaluation Summary Rating

comments	I rate this as 9.8/10. This rating, in my mind, expresses the chances of overall success. In my view, this project has great potential to be successful and useful. The focus of the project is tight and well defined. The EwE platform is tried and true. The authors have already developed an EwE model for the Delta, and the lead modeler for the proposed project was the developer of that initial model, along with her advisor. The data for the spatial component exist already and do not need to be collected. The NOAA participants who will help with the Monte Carlo application are either the same or close to those who developed the Monte Carlo application for EwE, and that Monte Carlo application allows for some measure of the uncertainty in

	results, which is valuable. The quick run times of the model make it well suited to the exploration of system dynamics by a wide range of users. All the PIs have excellent to good credentials, and are connected to management agencies. The urgency of the project is obvious, given declines in the Delta ecosystem and continued perturbations thrust upon it. This project could still certainly fail for various reasons -- perhaps on account of poor communication or collaboration among distant partners, or on account of some failure on the part of a lead PI who is essential to overall success -- but it seems to have the cards stacked heavily in its favor.
rating	Superior