Selection Panel Review Summary

Proposal No.: 006
Proposal Title: The Role of Life History Variability on the Population of Delta Smelt and Longfin Smelt
Principal Investigator: James Hobbs
Amount Requested: $303,747.00
Recommended Amount: $0

Summary: This proposal revisits some of the otoliths previously examined and includes others from various collecting efforts to compare the degree to which different 'contingents' are found within the delta smelt population – specifically those that move rapidly down to low salinity water versus those that stay in the freshwater of the Delta for up to three times as long. By comparing the environmental conditions associated with the capture of fish in different years, the Principal Investigator hopes to identify conditions controlling their distribution, and thereby largely, their fate.

Assessment: This proposal would provide valuable information about Delta smelt needs by directly addressing the importance of sources of mortality on early life history and the selection of different life history strategies. The applicant has a good record in regards to doing this research and the work is feasible. Some of the finer detail work, such as individual areas of origin for smelt may be more speculative. However, the proposal is unclear, poorly written, and lacks items that could easily have strengthened the application (such as previous publications by the author). The reviewers felt that they had to make too many assumptions about what was actually proposed to be confident about what the Principal Investigator was proposing to do.

CALFED Ecosystem Restoration Program
External Scientific Review Form

Proposal Number: 006

Proposal Title: The Role of Life History Variability on the Population of Delta Smelt and
Longfin Smelt

Reviewer: #1

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

 Correct X

General Review Questions:

Along with your written observations in response to the questions below, please rate each using
the following criteria:

> Excellent: Outstanding in all respects
> Very Good: High quality in nearly all aspects
> Good: Quality work, but with some deficiencies
> Fair: Lacking in one or more critical aspects
> Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described?
   Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the
   proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

   Comments:

   Yes the proposal describes the ecosystem goals it is designed to address.

   It is nice to see explicit hypotheses, although they are somewhat simplistic. For example,
   with all the work that has been done on Delta smelt, can't the PI's provide more synthetic
   hypotheses than just "life history diversity is greater pre-POD" etc? Please describe the
   mechanisms that would make it greater. The same problem exists for several other hypotheses
   regarding changing patterns in life-history diversity or how flow will affect these patterns. In
   addition, there are no hypotheses linking life history diversity with population status, recruitment
   or resiliency. On the other hand, the range of hypotheses is excellent and covers most of the
   potential existing relationships between flow and larval life history and the PI is to be
   commended for that.

   The section on mechanisms doesn't really deal with mechanisms in the strict sense, but seeks
   to determine whether correlations exist between various physical factors and life history
   diversity. Greater synthesis could have been employed here and also there appears to be little
   consideration of the affects of combined processes such as temperature and flow. Modern

statistical techniques allow the evaluation of such processes using AIC and mixed model approaches in either R or SAS.

It was a little disappointing to see the linkages to ERP goals referencing 2009 material rather than the current PSP (Section 6). Although the proposal clearly falls within the goals of the ERP PSP, this was not well established in Section 6.

Rating: Good

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

I think there are some unresolved issues in the methodology. For example the SI ratios plotted in Fig. 2 show a relatively constant ratio once salinities reach 5 ppt and that means that it will be difficult to distinguish salinities above this level, if I am interpreting this graph correctly. This could present substantial problems for detecting differences in life history patterns when salinities are above this level.

Is there a logical justification for the 30, 90, and 150 day classification system for larvae? Why discrete categories and how do the intervals work (e.g. are larvae with a 31 or 100 day residency period discarded from the analysis)? This seems like a tremendous loss of information. Why even use discrete categories?

It would have been nice to see some examples of the SI ratio from scales and otoliths, especially documenting the differences between larvae that had different residency times. Given that many of the samples have already been collected, it is not unreasonable to expect some preliminary data. In addition, how much variability is there in these measurements? Finally, the Hobbs et al. 2006 paper used to justify the otolith SI ratio methods is not in the Reference section. This is unfortunate.

I was surprised that there was little discussion of how the different biological characteristics, different movement patterns and different distributions of longfin and Delta smelt might influence the hypotheses and study results. This is an example of the lack of synthesis present in the proposal. For example, longfin smelt go to sea and this will certainly affect the SI signature observed in older fish.

Did I miss it or is there really no description of sample sizes to be used in the analysis? I can find a total "available" samples but no discussion of how many individuals will be analyzed per year or per residency category.

Better proofreading would have increased my rating of this proposal and helped keep sentences like the following out of the text "I have a demonstrated publication record that and I have demonstrated with pilot data the established patterns of life-history contingents, and have provided some insights to the mechanisms and resulting impacts of freshwater exports on the resultant phenotypes of successful recruits."

Finally, given that much of the data are from previously collected samples, it would have strengthened the proposal if the PI had plotted the frequency of high, average and low water years during the sampling period.

Rating: Fair

3. **Feasibility.** Is the proposed project's approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc…)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

See comments above in Approach. The project is feasible if the problems with the methods can be resolved.

Rating: Fair

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

The conceptual model is incomplete and really just involves a series of statements regarding the fact that there are species whose recruitment and year-class strength may be affected by complex larval life history patterns. The conceptual model also includes a very brief literature review. A graphical model would have been very helpful as would have a model that explained how differential selection coupled with environmental variability could produce different larval life history patterns for smelt in the Delta.

Rating: Fair

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

Not really described in the proposal.

Rating: ?

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

Yes to all of the above, although a higher rate of productivity is expected, given the PI's qualifications, time budget, and funds requested (see below).

Rating: Content -Very Good, Quantity = Fair

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

Yes, Hobbs has a long history of work with Delta smelt and has recent work on longfin smelt. This proposal definitely advances our knowledge of both of these species.

Rating: Very Good

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

Given the brief text in the Qualification section of the proposal and lack of a vita in the proposal this is difficult to answer. Hobbs and UCD have the infrastructure to complete the project and Hobbs has an excellent knowledge of smelt and the Delta. Without a list of publications per previous project I cannot assess Hobb's track record.

Rating: Qualifications Good, publication record?

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

The benefit of two publications in refereed journals from three years of work from an experienced PhD is very low given the cost of this project and general productivity standards for experienced researchers. If you took the $300K and funded multiple PhD students on this project you would probably triple the cost/benefit ratio.

Rating: Poor

Additional comments:

None.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Inadequate. (Very good ideas but poor description of the methods yields a rating of Inadequate, but the PI should be encouraged to correct the deficiencies and resubmit to another relevant PSP.)

Please provide a brief explanation of your summary rating:

    See above and comments in the proposal. You really need a rating that says "Good ideas but inadequate methods, etc."

CALFED Ecosystem Restoration Program
External Scientific Review Form

Proposal Number: 006

Proposal Title: The role of life history variability on the population resiliency of Delta smelt and longfin smelt

Reviewer: #2

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

- **Correct**
- ~~Incorrect~~

General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

Excellent: Outstanding in all respects
Very Good: High quality in nearly all aspects
Good: Quality work, but with some deficiencies
Fair: Lacking in one or more critical aspects
Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

Comments:

The problems are real and well described and appear to strongly address ERP goals of recovering delta species and communities. My concerns with the hypotheses are that the basic concepts are not well described and it is not apparent that they can be effectively applied to smelt in the Delta.

Rating**:** Good

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The understanding of how Delta and/or longfin smelt subpopulation or stock success varies in the present delta system is confounded by operational and climatic variation.

The study design does not appear to be adequate to address the complexity of the system.

The approach is suitable for salmonids, but the case for smelt in the SFB system has not been convincingly made. Unlike anadromous salmonids, SFB smelt species probably do not spawn and rear in streams with unique drainage characteristics to which returning adults can later home. Salmonid spawning streams are separate and have unique Strontium (Sr) and other characteristics that can be analyzed to identify the natal streams of returning adult salmon. The sources of water in the greater Delta region are many, and the complex mixture found at any point in time in the Delta could be ever-varying and unique to the moment—the composition could vary depending on the relative contribution of flows from the Clear Lake drainage, precipitation in the Sacramento and San Joaquin valleys, the operation of a multitude of dams, and snowmelt from a variety of drainages in the Sierras. Thus we might expect the Sr signature at a point in the Delta to be different depending on how import and export of water is managed at the moment and how natural flows are varying with water years and climatic conditions at the time and place a cohort of smelt is spawned. The study design does not appear to be adequate to handle these confounding factors and it is not apparent that the PI appreciates them.

Rating: Good

3. **Feasibility.** Is the proposed project's approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc…)? Does the proposal thoroughly address requirements such as environmental compliance and permitting?   Is the scale of the project consistent with the objectives?

   Comments:

   The primary tasks of otolith geochemistry and age and growth are highly feasible and proven for a variety of species under most circumstances. These two tasks can be accomplished in the time allowed. Accomplishing Task 3 with the time and resources requested is far less feasible. Permits and access appear to be in place.

   Rating: Good (idea).

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

   Comments:

   As nekton, fish species select environmental conditions most suitable for their current Life History Stage (LHS). Habitat is where a species can live but where it lives well, as evidenced by good survival and growth, is driven by water quality and other environmental variables that fit its ecological requirements. These places or sites vary with climate and water manipulation actions in the SFB Delta. Confounding factors may mislead interpretation in a simple analytical design. The hypothesis that more freshwater resident fish will lead to an increase in abundance may be difficult to test. The statistical model is not described adequately on page A8 (Task 3). $Y = \text{outflow}_{weekly} + \text{temp}_{weekly} + \text{hatch date} + \text{natal-site} + \text{etc} + E$ is not too informative, nor is the statement that "… the diversity of contingents will be regressed in relation to the population abundance and salvage to understand the role of contingent diversity in population resilience."

   My concerns with diversity and contingents are described under 'Additional Comments' below.

   Rating: Good

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

   Comments:

   There was nothing provided in the proposal to evaluate the year-to-year progress. Deliverables do not equal evaluation.

   Rating: Poor

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

   Comments:

   I expect something of value would come of the research, especially with regard to tasks 1 and 2. These products can be published in the peer-reviewed literature and would be widely available. Whether or not task 3 is feasible, the effort should be worthwhile and might serve as a proof of concept. How can we know that any individual that is captured and analyzed has or would have successfully reproduced in the sense that it managed to deliver offspring to the next spawning generation? Producing eggs and larvae does not mean that an individual has successfully reproduced. Likewise, evidence that an individual spawned is not sufficient information to measure success. Evidence that it died without reproducing in the diversion system (SWT or CVP) is sufficient to measure failure! Can the proposal test for failure to manage for success?

   Rating: Good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

   Comments:

   The proposed project appears to build on past work without duplicating any previous research. I easily found eight papers by the author that are highly or moderately relevant to the proposed work. Several of these might have been cited in the proposal to help make the case.

   1. Title: The use of otolith strontium isotopes (Sr-87/Sr-86) to identify nursery habitat for a threatened estuarine fish
   Author(s): Hobbs JA, Lewis LS, Ikemiyagi N, et al.
   Source: ENVIRONMENTAL BIOLOGY OF FISHES   Volume: 89   Issue: 3-4   Pages: 557-569   Published: DEC 2010

   2. Title: Likely Population-Level Effects of Contaminants on a Resident Estuarine Fish Species: Comparing Gillichthys mirabilis Population Static Measurements and Vital Rates in San Francisco and Tomales Bays
   Author(s): McGourty CR, Hobbs JA, Bennett WA, et al.
   Source: ESTUARIES AND COASTS   Volume: 32   Issue: 6   Pages: 1111-1120   Published: NOV 2009

   3. Title: Using Trace Elements in Pectoral Fin Rays to Assess Life History Movements in Sturgeon: Estimating Age at Initial Seawater Entry in Klamath River Green Sturgeon
   Author(s): Allen PJ, Hobbs JA, Cech JJ, et al.
   Source: TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY   Volume: 138   Issue: 2   Pages: 240-250   Published: MAR 2009

   4. Title: Classification of larval and adult delta smelt to nursery areas by use of trace elemental fingerprinting

Author(s): Hobbs JA, Bennett WA, Burton J, et al.
Source: TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY   Volume: 136
Issue: 2   Pages: 518-527   Published: MAR 2007

 5. Title: Modification of the biological intercept model to account for ontogenetic effects in laboratory-reared delta smelt (Hypomesus transpacificus)
Author(s): Hobbs JA, Bennett WA, Burton JE, et al.
Source: FISHERY BULLETIN   Volume: 105   Issue: 1   Pages: 30-38   Published: JAN 2007

 6. Title: Assessing nursery habitat quality for native smelts (Osmeridae) in the low-salinity zone of the San Francisco estuary
Author(s): Hobbs JA, Bennett WA, Burton JE
Source: JOURNAL OF FISH BIOLOGY   Volume: 69   Issue: 3   Pages: 907-922
Published: SEP 2006

 7. Title: Validation of otolith growth rate analysis using cadmium-exposed larval topsmelt (Atherinops affinis)
Author(s): Rose WL, Hobbs JA, Nisbet RM, et al.
Source: ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY   Volume: 24   Issue: 10
Pages: 2612-2620   Published: OCT 2005

 8. Title: Retrospective determination of natal habitats for an estuarine fish with otolith strontium isotope ratios
Author(s): Hobbs JA, Yin QZ, Burton J, et al.
Source: MARINE AND FRESHWATER RESEARCH   Volume: 56   Issue: 5   Pages: 655-660   Published: 2005

Rating: Very Good to Excellent

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

     Dr. Hobbs is qualified by training and experience to conduct aspects of the proposed work, but the case has not been made that the overall project is feasible or that the PI has conducted overall proof-of-concept research on smelt to offer insights into the likelihood of success. The age and growth task and the **Sr** analysis task are both feasible and the PI is qualified, but the data integration task is questionable.

     Rating: Very Good.

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

10

The budget seems reasonable and relatively inexpensive given the technical tools to be used. I did not see justification for the overhead rate in excess of 10% as requested in the RFP; however, 25% overhead is not unreasonable.

Rating: Very Good to Excellent

Additional comments:

The proposal suffers from several shortcomings—a lack of clarity of concepts or definitions, poor editing, and missing or mis-cited references. In addition, there is little to indicate that the research is feasible.

What does salvage mean? Is it a euphemism? Does it mean killed by a water diversion program or rescued from a water-diversion process?

Likewise, 'life history diversity' is not a clearly defined term in general use that can be assumed to be understood. Like many other terms in ecology, it can have a variety of meanings for different individuals and its undefined use can cloud communications.

The concept of 'life history contingents' suffers the same ills as presented and used in this proposal.

Hobbs et al. (2010) is not in the Lit Cited section and may not yet be published or peer-reviewed. Yet we are asked to take it on faith that the concept of life history contingents is proven or convincingly demonstrated for SFBD smelt species.

Barnett-Johnson (2008) is not in the Lit Cited section either, unless the citation should be Barnett-Johnson et al. (2008). That study was on salmonids comparing different drainages at a spatial scale between or among drainages of far greater uniqueness than the probably milder differences that can be expected for spawning sites in the more localized conditions found in the smelt natal habitats.

Figures 2a and 2b are not referenced to anything in the Lit Cited section and do not seem to be convincing evidence that the salmonid approach will work for smelt species.

Another text reference is not included in the Lit Cited section (Hobbs et al. 2006).

Finally, in Task 3 on page A8 the figures 4a, b are mentioned but there are no such figures in the proposal. In the same section, mention is made of quantifying LH diversity and contingencies of some existing and new samples. There is no discussion of whether or not these samples are appropriate or sufficient to address the questions posed and I am not convinced that the PI appreciates the potential biases of using an inadequate database.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:
- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.

- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Adequate only

Please provide a brief explanation of your summary rating:

The proposal is not well developed and did not fully utilize the space allocated to make a good presentation. There are many mistakes, omissions and voids to fill.

CALFED Ecosystem Restoration Program
External Scientific Review Form

Proposal Number: 006

Proposal Title: The role of life history variability on the population resilience of Delta smelt and longfin smelt

Reviewer: #3

Conflict of Interest Statements:

I have no financial interest in this proposal (please mark correct response).

- Correct XX
- Incorrect

General Review Questions:

Along with your written observations in response to the questions below, please rate each using the following criteria:

> Excellent: Outstanding in all respects
> Very Good: High quality in nearly all aspects
> Good: Quality work, but with some deficiencies
> Fair: Lacking in one or more critical aspects
> Poor: Serious deficiencies

1. **Problem/Goals.** Is the problem that the project is designed to address adequately described? Are the goals, objectives, and hypotheses clearly stated and internally consistent? Does the proposal describe the ecosystem goals it is designed to address (link to ERP goals)?

   Comments:

   The proposal does a reasonable job of describing the problem with smelt, the POD decline and how the goals of the project might advance the knowledge of how smelt (longfin and delta smelt) might utilize the low salinity habitat of the Delta system. The proposed project builds on

previous work on both species but proposes to look more in depth at life history diversity patterns via strontium isotope signatures. A goal of the project is to define the population resilience of smelt, but it is not clear how the PI defines population resilience or how it may have changed within the delta. I don't think this PI understands what conveys resilience to a population. If habitat has declined in a way that has changed the carry capacity of the system for pelagic fishes, as some hypotheses suggest, the populations at their present state may be showing extreme resilience. The ERP goal this project addresses is stated as: How do native fishes migrate through the estuary, what factors affect their migratory behavior (see section 6) and what are the physiological tolerances and adaptive traits of native fishes that determine their resilience? I don't see how this proposal will address those issues for smelt. What this proposal is obviously about is the discovery of knowledge that will aid in the possible protection of habitat, help develop strategies for water management and aid the recovery of a native species at extreme risk.

Rating: Good

2. **Approach.** Does the proposal clearly describe its approach (including study design and methods, if appropriate)? Is the approach well designed and appropriate for meeting the objectives of the project as described in the proposal? Will the proposal contribute to our knowledge base?

Comments:

The approach is reasonable and the PI is experienced to conduct the research as proposed. It would have been helpful to reviewers to clearly describe the difference between what is being proposed to what was done in previous studies of both smelt species. Hobbs proposed to utilize old resources and samples and then add to that with new samples from the various monitoring efforts. One suggestion for possibly improving this effort would be to include fish from salvage operations at the water projects. If one of the principal goals is to understand if a particular life history pattern conveys population resilience or vulnerability to certain mortality factors, understanding which life history pattern end up as salvage would go a long way to determining which life history patterns, if any increases the probability of entrainment.

Rating: Very Good

3. **Feasibility.** Is the proposed project's approach fully documented and technically feasible? Can the project be completed within reasonably foreseeable constraints (e.g., acquiring permits, construction, weather, etc…)? Does the proposal thoroughly address requirements such as environmental compliance and permitting? Is the scale of the project consistent with the objectives?

Comments:

The project is feasible based upon previous published results. The technique's weakness is that for identifying habitat patterns within this system it cannot distinguish habitats at salinities above 4-5 psu because of the convergence of the strontium isotope ratios above that salinity range. The question that needs to be asked is: Do the fish that reside above that salinity convey any higher probability of population survival/resilience than fish in low salinity/freshwater habitats? This technique is limited in its ability to answer that question but perhaps tagging techniques can be developed in the future to address those limitations. Nevertheless, this study

should add to the knowledge on smelt and allow this young PI to try methods that might expand the capacity of his toolbox.

Rating: Very Good

4. **Conceptual Model.** Does the proposal provide a conceptual model that describes the interconnections among the key ecosystem components relevant to the action(s) being proposed? Does the conceptual model clearly explain the hypotheses it is testing?

Comments:

Given all that is known about smelt, the conceptual model could have been better developed and presented by showing how the smelts are known or hypothesized to coexist in time and space within the system. The conceptual model as presented would also benefit from a diagram.

Rating: Good

5. **Performance Evaluation Plan (Monitoring Plan and Performance Measures).** Does the proposal include a plan for project performance evaluation (monitoring to assess results and evaluate assumptions and hypotheses)? Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Will future studies or restoration projects be able to incorporate the information from this project?

Comments:

I could not find a performance evaluation or performance measures section in the proposal. I checked carefully and the proposal goes from 3 to 5 in the numbered sections with no performance measures explicitly titled or stated. It does provide deliverables. Future projects should be able to build upon this project.

Rating: Fair

6. **Expected Products/Outcomes.** Are products of value likely from the project? Are products of value also likely from the individual components of the project? Will the results of this study be readily accessible?

Comments:

This project has a high probability of some level of success and should provide valuable data for managers struggling with managing smelt declines. The results should be readily accessible through publications and reports.

Rating: Very good

7. **Previous Related Work.** Does the proposed project continue past work or include any work that could be considered a duplication of work previously done or currently being done by others?

Comments:

As stated earlier, the PI worked with smelt otoliths before and published multiple papers on both species and the otolith chemistry. The difference that this new work would provide over previous efforts should have been highlighted more in the proposal.

Rating: Very good

8. **Qualifications.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project? Do they have working knowledge of California streams and rivers?

Comments:

Hobbs has been successful in previous smelt projects with these methods and is the logical choice for continuing this line of research. The infrastructure is available at UC Davis and other aspects of support are available to complete the project. Hobbs has worked in the Delta for 10 years or so and has the experience required for some level of success with this line of research.

Rating: Excellent

9. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed? If the budget is considered to be excessive or inadequate for the work proposed, please highlight areas of the budget that may be of concern.

Comments:

The budget is reasonable and adequate for the proposed work.

Rating: Excellent

Additional comments:

None.

Overall Evaluation Summary Rating

In the space below, please provide an overall rating of the proposal using one of the following categories:

- **Superior:** Outstanding in all respects with superior technical and scientific value and no significant concerns. Expected to add substantial new thinking/concepts to our knowledge/understanding of the topic proposed.
- **Above Average:** A very good proposal with at least high technical and scientific value and no significant concerns. Will add solid basic knowledge/understanding of the topic proposed.
- **Adequate:** A reasonable proposal without serious technical deficiencies and at least adequate value scientifically. Will add some useful knowledge to the topic proposed.
- **Inadequate:** A technically deficient proposal and/or one with low value, serious impediments or concerns. Will not likely change our basic knowledge/understanding of the topic proposed.

Rating: Above average

Please provide a brief explanation of your summary rating:

Learning as much as possible about how habitat is utilized by smelt is an important pursuit in the Delta, and Hobbs and the otolith chemistry is an obvious path to pursue smelt habitat issues. However, this technique should be coupled with other techniques or new methods attempted so as to provide a better refinement of the scope of the habitat use patterns. It may be impossible to mark smelt by traditional methods but some sort of otolith marking study might add to the understanding of habitat use.

The proposal itself was somewhat weak in presentation and the problem and potential of this research could have been better constructed. Hobbs says he will write a paper on population resilience based upon these results. I do not believe these results can provide a basis for understanding population resilience of smelt based solely on the data this study will provide. In other words, I have rated this proposal higher than it probably deserves based solely on what was written.

In spite of these shortcomings and the limitations of the technique above a salinity of 4 or so, the problem needs to be addressed ASAP and this is the best avenue available at present to address smelt habitat use issues. I strongly suggest that if this project is funded that ERP consider salvaged fish be included as part of the study, since entrainment is one of the risks that managers would like to reduce or at least better understand. With salvaged fish properly incorporated into this study it will directly provide some knowledge of what life history patterns increase entrainment risks. The trick is to properly represent entrainment patterns in the overall habitat use picture for smelt.