Proposal Reviews

#84: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Humboldt State University, Department of Environmental Resource Engineering

Initial Selection Panel Review	
Research and Restoration Technical Panel Review	
Delta Regional Review	
San Joaquin Regional Review	
Sacramento Regional Review	
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Environmental Compliance	
Budget	

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**X**

Amount: **$0**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None.

Provide a brief explanation of your rating:

Technically, the IBM model has problems with getting to and beyond model validation, and the IBM needs validation before the other tasks are productive. In addition, there are concerns with scaling up the IBM to a larger portion of the population. It does not indicate a focus on EWA and listed salmonids. Regional reviews were low, indicating poor support for the Delta and Central Valley. The proposal also lacks coordination with the various environmental water programs cited.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	Provide a brief explanation of your summary rating
-Superior	**The review panel felt that the proposal should initially be restricted to tasks 1-3 which are directed to the authors objectives: 1) to adapt reservoir models that predict release flows and temperatures under alternative EW flow release policies, and 2) to adapt and validate a realistic model of how reservoir release flows and temperatures affect salmon spawning, egg incubation, fry growth and survival, and long-term production. With proper validation, the utility of the model for addressing the benefits of EW releases could then be demonstrated through workshops with local interests and decision-makers. If the two year project is successful and generally accepted by potential users as having potential for assisting in decision-making, then a new proposal should be submitted for future funding to address the policy and adaptive management issues given in the authors objectives 3 and 4.**
XAbove average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   All technical reviewers felt the goals and objectives were clear with a clear conceptual model. The primary goal is to develop simulation tools based on Individual Based Models of chinook salmon in two rivers to be selected later. Further they state that they would develop guidance for adaptive management and compare salmon production using Environmental Water for in-river enhancement vs. reducing entrainment at Delta pumps. The most important objective is that of adapting and validating a realistic model of reservoir release

flows and temperatures as they affect spawning, egg incubation, fry and long-term population dynamics. The fundamental hypothesis states that the simulator can reproduce the key mechanisms by which flow releases affect freshwater stages of salmon.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

   Technical reviewers felt the likelihood for success was high but several cautions that the authors had oversold IBM and did not offer explanations for scaling up to the population level. The most attention should be directed toward model testing and validation of the stated hypothesis. Only after such demonstration is the likelihood of use by decision-makers. Therefore task 4 is premature. One reviewer questioned the efforts to use the model to estimate the benefits to salmon production of using EW for in-river enhancement compared to using EW to reduce Delta pump entrainment and how field studies would be used to compare salmon benefits. Would not empirical smolt production and survival estimates be a better approach?

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   The technical reviewers all felt that the modeling products were good and would significantly advance the state of scientific knowledge. However a shortcoming is the little attention given to or evidence of any efforts towards demonstrations, workshops, etc. necessary for decision-makers to accept models.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   All reviewers felt the budget was reasonable. Also local involvement was inadequate, even lacking.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   The three regional reviews all ranked the proposal as low and were concerned about the lack of in-Delta modeling. They expressed a low level of confidence because of a feeling that data was lacking to build the models.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   No compliance or budget issues were identified.

Miscellaneous comments:

Technical reviewers rated the proposal as good to excellent and would contribute to scientific understanding. This is quite ambitious and may best be scaled back to two years with increased emphasis on testing and validation.

Delta Regional Review:

Proposal Number: 84

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

There is no provision for conducting in-Delta modeling, which is crucial to this project.

1. Is the project feasible based on local constraints?

   -Yes **X**No

   How?

   Perhaps the most important portion of this project involves evaluating "potential benefits of using EW for in-river enhancement, in comparison to the benefits of using EW to reduce mortality at Delta pumps." However, there is no provision for conducting in-Delta modeling, and hence no way to actually make a meaningful comparison.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   From the Restoration Priorities for the Delta and Eastside Tributaries Region:

   "7. Protect at-risk species in the Delta using water management and regulatory approaches.

   Long-term management of the water-use system to protect fish is important to accomplishing the goals of ecosystem restoration. Therefore it is essential to begin now to improve the scientific underpinning of regulatory activities and manipulations of water management to protect species of concern. New, creative solutions to water management dilemmas can also result from better scientific knowledge of environmental processes in the Delta, fish behavior and biology, and the influences of water management. Priority will be given to studies of processes relevant to the interconnections of water management, regulation and fish protection. Priority will be given to studies that address processes relevant to, or that directly address the following topics:

   Minimize effect of diversions on fish: Projects are needed that address the following questions about diversion effects on fish (Strategic Goal 1, At-risk species):

   · What is the relationship between screening water diversions and protecting individual fish, populations and ecosystems? · What are the full, economic or non-economic, cost-benefit implications of current water use, water management and fish protection strategies? Priority will also be given to studies that consider the limits of such analyses. · Can models or

statistical relationships be used to improve knowledge of the relationships between management actions and their influences on fish populations? · What are the implications and environmental tradeoffs associated with the environmental water account?

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   The applicant indicates familiarity with historical/current use of EW to offset mortality at the SWP/CVP, and the intent to consider information that will be obtained from implementation of the four-year EWA "experiment."

   The applicant indicates the intent to use the results of another Calfed project involving the development of "an adaptive reservoir management program for Clear Creek below Whiskeytown Dam" when they become available.

   This project will utilize as much as possible existing models (e.g., CALSIM II) that have been used by others to examine various EWA scenarios.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   This work will be done by HSU and Arcata area consultants and USFS employees who communicate with local resource managers and researchers.

Other Comments:

N/A

San Joaquin Regional Review:

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Much data for models is not available so models would have a low level of confidence. The project would not address Delta smelt impacts.

1. Is the project feasible based on local constraints?

   -Yes **X**No

   How?

   The proposal did not thoroughly address the availability of data needed to make the models useful from a practical adaptive management standpoint, including temperature data, adequate surveyed cross-sections, and sediment and hydrology (fluvial) model availability, which is essential to determining the potential spawning success of fish in any particular stream. As the site specific stream was not identified yet, making these feasibility determinations was not possible. Though based on our work on the SJR, much of the needed data is not available that would make such models actually useful from a practical management standpoint.

   The salmon population model does not appear to include fluvial constraints that would be able to identify the amount of spawning gravels available under specific flows or the flows necessary to keep the gravels free from sediment. How can populations be determined without knowing this information, or knowing the hydrologic variability in the stream being studied, which the proposal said would not be included.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   It is clear this project pertains to several SJR priority goals, especially 3 and 6, relative to improving rearing and spawning habitat and downstream fish passage and conducting adaptive management experimentation relative to flow conditions. This project would possibly enable improvement of spawning and rearing habitat through flow modifications using EW in an adaptive management approach.

The project proposes to prepare models that would help accomplish those goals.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   This project proposes to address a significant water management question: should EW be used for flow releases to enhance instream fish populations instead of solely for the purpose of rescuing entrained fish in the Delta. This question deals with issues directly related to CALFED and CVPIA goals.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   The entire study team is from California. They propose to prepare the model for a Central Valley stream yet to be identified.

   Various agency personnel were consulted during the preparation of the proposal. No riverine stakeholders are involved as partners.

Other Comments:

CA stream not yet identified. Can't determine SJV priority without knowing stream.

Sacramento Regional Review:

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

Proposal did not adequately coordinate with existing efforts, including south of Delta stakeholders and institutions. Proposal seems to lack clarity over expected management benefits.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Project aside from local access contacts seems feasible; however management applicability seems questionable due to the rather simplistic evaluation parameters and assumptions regarding the river systems being simulated. Proponents seem to have ignored previous and ongoing similar evaluations, and should have discussed in detail how this project will materially improve future management decisions. Interesting that the proponents cite success of a resident trout model to buttress this proposal, without significant discussion of the complexity differences between trout and salmon.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Project seems most applicable to Restoration Priorities for the Sacramento Region #3, "Conduct adaptive management experiments in regard to natural and modified flow regimes to promote ecosystem functions or otherwise support restoration actions".

   The extremely narrow focused approach including species (race - primarily fall chinook), reach (constrained small study areas) and physical conditions simulated (primarily temp./flow) begs the question of how this study would materially advance management decisions on the system(s) that are orders of magnitude more complex. Finally, a thorough discussion of how this proposal materially advances previous and ongoing efforts (eg. USFWS/DFG efforts among others).

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   -Yes **X**No

   How?

   Project proponents have contacted CALFED science panel members and have briefly referenced USFWS evaluations for Sacramento River chinook and an ongoing ESSA Technologies evaluation for Clear Creek. They do not, however make a convincing argument that this proposal will materially improve future management applicability. As stated under #2 above, while the proposal involves some rather complex analytical techniques, the somewhat simplistic view of the system(s) and life histories being evaluated brings into question the value and applicability.

4. Does the project adequately involve local people and institutions?

   -Yes **X**No

   How?

   Proponents aptly point out that local access is not a major portion of this proposal, although even the minor portion was not coordinated with and local people or institutions. Additionally, proponents assume some level of agency participation in the initial task development without any upfront contacts or commitments, including apparently little or no review of existing information or evaluations.

Other Comments:

Proponents suggest a complex analysis of a constrained simplistic view of the system(s) and species, which will be inflated by some future user to provide population level management decisions. They aptly point out "Complex population-level models of the many processes by which reservoir operations affect salmonids do not have a good track record." A recent review of such a model for the Columbia River salmon was highly critical, focusing on the problem that population data of adequate quantity and quality to parameterize and validate the model will never be available (Paine et al. 2001).

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **84**

Applicant Organization: **Humboldt State University, Department of Environmental Resource Engineering**

Proposal Title: **Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**I must rate this proposal as excellent. Although there are some risks and technical weaknesses, the sheer importance of the topic warrants high priority. The proponents have a solid grasp of the problem and a reasonable starting point for exploring the details. Given the scientific and political constraints, their approach may be the best available.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Goals, objectives, and hypotheses are clearly stated, logically linked, and explicitly related to the ERP Draft Stage 1 Implementation Plan. The proposed work is ambitious and a bit risky but directly addresses the very important and contentious (but scarcely studied) issue of how to use "environmental water" most effectively.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project

justified?

Study on this topic is not only justified but crucial to current water management practices. Other approaches may also be instructive but computer simulations, such as the proposed work, are clearly the tool of choice until additional knowledge is generated regarding the consequences of allocating large amounts of water to particular restoration practices. Five conceptual models are briefly described in the text. A fuller elaboration of these would have been helpful but the rationale for each objective was adequate to justify the proposed work. The selection of a research vs demonstration project was clearly justified on the basis of uncertainty and cost.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Definitive resolution of the problem at hand (use of environmental water) is so costly that simulation is probably the only politically palatable approach. Given that constraint, the approach is well designed. Even so, it is risky in that most findings are virtual rather than real (observable). The proposed work is innovative and will certainly add to the knowledge base, including new models, some of which (eg, IBMs for salmon) may have broad spin-off value in other contexts. Although this study may not offer the last word, it directly addresses key assumptions about how environmental water should be used; it is very likely to generate new questions and suggestions regarding that use. These will be of great interest to decisionmakers. Parts of the field-study design could have been better explained. For example, why is it important for the study rivers to vary in size? Two pseudoreplicates (reaches) in 2 different-sized rivers probably will not confer much statistical confidence or power to the findings.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The proposed work seems "feasible" although the credibility of the outputs are hard to assess. The value of any simulation research is debatable, and depends on the skill and intuition of the modeler, as well as the history of off-the-shelf models (some of which will be used here). Fortunately, the proposed work includes some sensitivity analyses, simulation of the uncertainty of monitoring fish populations, and field validation. However, I would also like to see a comprehensive assessment of how output errors propagate across the various modeling stages (eg, from reservoir models of flow/temperature to IBMs to simulations of water-release effects on salmon populations). Do the confidence intervals around model outputs really allow the biotic consequences of various release scenarios to be dinstinguished? Up-scaling of findings is also a concern. The proponents seem keenly aware of the issues related to predicting population features from IBMs. Although it's not clear these can be completely resolved, the proponents may be able to work around them to generate useful findings. In any case, alternative approaches seem even less useful. However, the proponents did not adequately address how the findings from the enclosure experiments could be confidently scaled-up to elucidate population-level effects.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

Performance measures are appropriate and adequate and staged so that outputs of some objectives are directly dependent on outputs of others.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Several valuable products are likely, including models, reports, journal articles, and presentations. Moreover, these are likely to be useful to both scientists and water managers. A series of new research questions is also likely to be generated.

7. **Capabilities.** 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?

   Although lacking CALFED experience, the team seems highly qualified and productive based on similar previous work.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget is large but so are the potential benefits of the proposed work.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **84**

Applicant Organization: **Humboldt State University, Department of Environmental Resource Engineering**

Proposal Title: **Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Very well thought out proposal. Builds on previous research conducted by all applicants of this proposal. Demonstrated prior success by applicants indicates a high probability of future success.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Yes, yes, and yes. Three goals, 4 objectives and three hypotheses are explicitly stated in this proposal. The goals put forth include development of simulation tools for evaluating best uses of environmental water, providing guidance for adaptive management regarding EW, and a comparison of the tradeoffs associated with alternative environmental water uses. The objectives that follow are very clearly linked to the overall goals.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project

justified?

The conceptual models are clearly stated in the proposal and anticipated reviewer criticisms are very thoroughly addressed. The study is justified in terms of the dire need to make sound decisions over beneficial uses of environmental water.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The research approach is very appropriate for meeting the objectives of the project and is explicitly justified in terms of time, financial costs, and environmental variability. The information that is produced will be both novel and provide a starting point for water management. The results of this work further provide a template for monitoring population responses and providing a feedback loop for adaptive management.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The research approach outlined by the objectives is fully documented and the applicants demonstrate support for their approach by citing publications in primary literature. The liklihood of success is very high and the applicants have outlined measures that they will take (e.g. buyout of teaching time, etc.) to assist in meeting deadlines.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Project specific performance measures that are listed in detail are thoughtful and target deadlines are posed for the completion of each measure.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The models that will be produced, the scientific findings from parameter specific field studies, and the manuscripts published will all be highly valuable to the scientific community as well as for the specific systems chosen for study. It is likely that this project could significantly advance knowledge in the area of individual based modeling and stream flow management.

7. **Capabilities.** 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?

   The applicants' proposal leaves no doubt that this team of people is capable of effectively implementing the proposed project. The applicants possess highly impressive qualifications and an outstanding list of publications.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The cost/benefit ratio appears reasonable and adequate for the work proposed.

Miscellaneous comments:

I found this proposal to be of exceptionally high quality in its preparation and presentation of concepts, ideas, performance measure evaulation, and proposed project management.

I would suggest that if this project is funded, the applicants might consider incorporating agency input for developing alternative scenarios in modeling environmental water use as well as in developing the policies that they propose in Task 4. It will be important for acceptance of this type of modeling approach as a valuable management tool. The applicants may fully intend to do this, but it only appeared to be mentioned in the travel budget justification.

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **84**

Applicant Organization: **Humboldt State University, Department of Environmental Resource Engineering**

Proposal Title: **Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

No formal relationship. I talked with Railsback a couple of years ago about developing a model for use by Trout Unlimited, but the project never materialized.

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent **-**Good **-**Poor	**The problem identified as the focus of this research proposal is very important in the context of river restoration in California. Knowing more about WHERE and WHEN to allocate limited water to fish is key to long-term sustainability of salmon in the heavily-altered Bay-Delta-River system. I view this project as having the potential to produce a "breakthrough" in the approach to environmental management of water resources.** **The scope of this project, and the team of investigators, is excellent. The modeling framework proposed here is VERY likely to provide high quality information that can be directly used in a risk management context. The IBM approach in particular is innovative and, in my opinion (based on knowledge of fish habitat type models and of IBMs), by far the most well suited to generate realistic and defesible results. The IBM approach is not simple (or simplistic) but Railsback is imminently qualified to do this model right. He has been a pioneer in this field and has produced very high quality (and careful) work, as evidenced by his publications in top tier peer-reviewed journals. Indeed, he is arguably THE leader in the field of applying IBMs to aquatic ecosystems (certainly to salmonid populations). His active involvement on the project gives me high confidence that the investment in this project will be worthwhile. The other modeling components I am less familiar with. However, the approaches appear reasonable in that they are based on existing models (with options left open to "tweak" these models using alternate approaches, if needed). Eschenbach and Lamberson appear well qualified to execute these modeling components effectively. Overall, the model components are integrated and should provide an excellent adaptive management framework.** **The empirical (field) component of the proposed research is perhaps the weakest link, if only because the methods are not explained and supporting citations are not provided. However, Harvey has excellent empirical credentials with salmonids, so I would not overly worry about this seeimingly weak part of the proposal. In my view, collecting field data will be useful, but it is NOT CRITICAL to the success of this project. There is a tremendous need for more biologically-based decision tools in river restoration, and the emerging computer technology emerging from complex adaptive systems, when coupled with basic knowledge of fish behavior and physiology, makes an IBM simulation experiment very attractive for moving forward (adaptively) in this management arena, which is beset with complexity and uncertainty.** **In short, this is a very creative proposal with a high probability of success and subsequent impact. I have no reservation in stating that this outstanding research proposal should be funded in full.**

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

Yes, the proposal is logically coherent and clearly states goals, objectives, and hypotheses. The "concept" is extremely timlely (see recommendation).

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   This project is "cutting edge;" therefore, it is at the expanding boundary of "existing knowledge," which the investigators themselves are helping create. The conceptual model is very clearly stated and justified. This project is appropriately presented as a "research" project.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   This exciting project will almost certainly produce NEW knowledge and potentially result in a "breakthrough" approach to risk management of Bay-Delta-River resources. The simulation modeling approach is justified, given the complexities and uncertainties of the real world, and given the recent (and still emerging) recognition that the IBM approach can adequately simulate real-world biological problems. The linkage of the IBM to water management models and performance evaluation (adaptive management) models is a very strong point.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Yes, the modeling approaches to be used are understood and the expertise of the investigators makes further model development and application to the specific problem at hand feasible. I view the likelihood of success as great. Yes, the project scale is consistent with the objectives.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Yes.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The simulation products from this project are most definitely of value to CALFED.

7. **Capabilities.** 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?

   I cannot speak to the first question. However, in the context of the present proposal, this is an excellent and well qualified team with the facilities to accomplish the project.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Yes, I would say so (although I did not focus on this).

Miscellaneous comments:

External Scientific: #4

Research and Restoration External Scientific Review Form

Proposal Number: **84**

Applicant Organization: **Humboldt State University, Department of Environmental Resource Engineering**

Proposal Title: **Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**Good technical approach but too much detail on evaluation of Environmental Water and not enough on model calibration, validation and demonstration of potential use in decision-making.**
XGood	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The primary goal is to develop simulation tools based on Individual Based Models of Chinook salmon in two rivers to be selected later. Further they state that they would develop guidance for adaptive management and compare salmon production using Environmental Water for in-river enhancement vs. reducing entrainment at Delta pumps. The most important objective is that of adapting and validating a realistic model of reservoir release flows and temperatures as they affect spawning, egg incubation, fry and long-term population dynamics .The fundamental hypothesis states that the simulator can reproduce the key mechanisms by which flow releases affect freshwater stages of salmon.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The proposed model once developed and validated would be most useful. Most attention should therefore be directed toward model testing and validation of the stated hypothesis. Only after such demonstration is there likelihood of use by decision-makers as proposed.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Conceptual models are quite sound and the investigators propose to test the basic hypotheses by applying a pattern-oriented validation process. However no description of this process is given and no study design for site data or field work. To much discussion is presented on the potential use of the model once developed for decision-making.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The model development and documentation is well presented and technically feasible. The likelihood of producing a working model with the outputs described is high. Without increased emphasis on model testing, validation and demonstration the likely of use as proposed is low. The authors admit that complex population-level models of the many processes by which reservoir operations affect salmonids (as proposed here) do not have a good track record.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Progress reports, draft model documentation and journal articles are to be prepared.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Model software, documentation and reports of model runs are proposed. There is little evidence of effort towards workshops demonstrations etc necessary for user acceptance.

7. **Capabilities.** 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?

   Investigators have excellent experience with these types of models.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The proposed budget is adequate for the effort proposed.

Miscellaneous comments:

This proposal is quite ambitious and may best be scaled back to two year focusing on tasks 1-3 with major emphasis on testing and validation

External Scientific: #5

Research and Restoration External Scientific Review Form

Proposal Number: **84**

Applicant Organization: **Humboldt State University, Department of Environmental Resource Engineering**

Proposal Title: **Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**The proposal is a mixture of technical excellence and serious inadequecies. The applicants are well qualified to deliver the IBM products. However low ratings by the regional reviewers and little detail in local involvement section does not indicate the applicants are predisposed to recognize their customers as an important part of the process. This is one step from poor.**
XGood	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Very good.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Excellent: the question of how to most effectively use "environmental water" is important and applicants adequately justify the need to question current practices.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Very good: the project will no doubt generate volumes of information, however use by decision-makers is more uncertain. I have concerns about hydrodynamic modeling and lack of effort to validate in task 3. If this approach is used to compare between tributaries the error is not so important, but if this is used to compare to EW use in other areas, this approach has BIG problems. Why use a "simulated system of two reservoirs described under Task 4. This approach is more difficult for Goal 3 to estimate the "benefits to salmon production of using EW for in-river enhancement compared to using EW to reduce Delta pump entrainment." The applicants will apparently try to address this with field studies to "compare the salmon production benefits of using EW for (a) enhancing in-river fry production vs (b) reducing Delta pump entrainment." Would not empirical smolt production and survival estimates be a better approach?

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Very good: the project is well within the grasp of authors as they have a good track record. The use of IBM to solve complex problems is greatly overrated by the authors.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Good: applicants correctly identify "appropriate performance measures for reasearch" inlcuding publications, presentations, and reports, however additional outreach to potential users should be inlcuded.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Good: products are too narrowly defined.

7. **Capabilities.** 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?

   Excellent.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Very good.

Miscellaneous comments:

Preparation of proposal was excellent. Low rank by regional reviews should be a cautionary note for panel. IBM is oversold while final comparisons to EW use to prevent entrainment is given little effort. Task 3 is field work that is not adequately described. Local involvement seems inadequate.

Environmental Compliance:

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Project proponents state that fall-run chinook is expected to be the study species, but that other races may be considered if appropriate for the study sites. If winter- or spring-run chinook are used, a 2081 will be needed, as they are state-listed species.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   XYes **-**No

   If no, please explain:

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

   As long as all necessary permits are obtained, this project is feasible.

Other Comments:

Budget:

Proposal Number: 84

Applicant Organization: Humboldt State University, Department of Environmental Resource Engineering

Proposal Title: Using Environmental Water for In-River Salmon Enhancement: Methods for Planning and Evaluation

1. Does the proposal include a detailed budget for each year of requested support?

   XYes **-**No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes **-**No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes **-**No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   -Yes **X**No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

   Requesting $1,224,734 State or $1,408,804 Federal (17a); Grand Total of 3-year budget is $$1,224,736 ($2 off State request).

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

If no, please explain:

7. Are there other budget issues that warrant consideration?

   -Yes **X**No

   If yes, please explain:

Other Comments: