

# Proposal Reviews

## **#106: Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed**

Pacific EcoRisk

**Initial Selection Panel Review**

**Research and Restoration Technical Panel Review**

**Delta Regional Review**

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## Initial Selection Panel Review:

### CALFED Bay-Delta 2002 ERP PSP Initial Selection Panel Review

**Proposal Number:** 106

**Applicant Organization:** Pacific EcoRisk

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

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).

<b>Fund</b>	
<b>As Is</b>	-
<b>In Part</b>	-
<b>With Conditions</b>	-
<b>Consider as Directed Action</b>	-
<b>Not Recommended</b>	<b>X</b>

Amount: **\$0**

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

**None**

Provide a brief explanation of your rating:

**Regional support for this proposal was weak, given that metal contamination of upper river sediments has not been identified as an area of concern pertaining to either water quality or aquatic biota. Regional reviewers indicated that the principal mining sources of the metals have been remediated in the proposed study area, and that concentrations of metals in bed sediments in the area are expected to decrease with time.**

**Three external scientific reviewers rated the proposal as good, and a fourth rated it as very good. The applicants are highly qualified to perform the proposed work, the proposed methods are proven, and the probability of successful completion was judged to be high.**

# Research and Restoration Technical Panel Review:

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

**Proposal Number:** 106

**Applicant Organization:** Pacific EcoRisk

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

**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.

<b>Overall Evaluation Summary Rating</b>	<b>Provide a brief explanation of your summary rating</b>
-Superior	<b>This is a good quality proposal employing proven methods to address a problem of general importance. There remain some doubts as to whether metals are a priority concern in the region of study and some minor administrative details that would need to be addressed if the project were to be funded.</b>
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?

**There was general agreement that the goals, objectives and hypotheses were clearly stated. Though two of the reviewers could not determine how hypothesis 2 (i.e., that metals in sediments are resulting in bioaccumulation by benthic organisms to levels that are adversely affecting fish populations, particularly salmonids) would be tested.**

**That sediments, in general, can provide an important repository for metals than can in turn affect benthos and their predators is well justified. There seem to be some questions, however, as to whether metals in the area of intended study are a priority issue. It was also pointed out that no measurements of metal body burdens in benthic organisms from the field sites will be performed (which could differ from lab bioaccumulation with standard species), nor benthic biomass at the field sites (which could be important with regard to**

hypothesis 2).

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?

**There was some concern that details of the sampling methods were lacking making it difficult to fully assess feasibility. But in general the methods used are fairly standard and appropriate.**

**It is unclear how problems arising from potentially confounding influences of non-metal contaminants (particularly with regard to toxicity testing and benthic community analyses) would be addressed. Also, how will the weight of evidence (toxicity, analytical chemistry, community structure) be combined?**

**No problems were indicated with respect to the applicants capabilities.**

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 main product arising out of this project would be an indication of the degree (concentration) and extent (in space) of sediment contamination with metals that could aid in management efforts. A database of the results will be publicly available on the web.**

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

**This 3 year project has a total budget of \$833,469 (or \$829,511 on p. 11). Most of the requested funds are for salaries and consultant services. The third year of the project will be spent entirely on report preparation and project management (seems expensive). Overall the project was considered somewhat expensive**

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 Delta Regional review gave this a low ranking. They noted lack of stated relation to other past and future projects of relevance. This review could not see how the data provided would inform impending decisions by landowners, ecosystem restoration agencies, regulators or other policy makers (other than to identify hot spots). Also noted was a lack of local involvement.**

**The Sacramento Regional review also gave this a low ranking given that accumulation of metals in upper River sediments has not been identified as a priority water quality/aquatic biota concern. Metal loadings from abandoned mine sites has been addressed and it is expected that metal concentrations should decline with time. Suggested that local involvement may not be necessary but coordination with stakeholder groups such as SRWP and Sacramento River Conservation Area should be a priority.**

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?

**Environmental compliance review recommended consultation to determine whether a 1601 is required; also needed to determine whether this is a project under NEPA.**

**Funding and time were not allocated to permit applications and permit fees.**

**Budget review could not understand explanation of indirect rates/overhead. Also not entirely clear on project management costs. There was also some discrepancy in the figure reported under 17.a**

**Miscellaneous comments:**

**None**

## Delta Regional Review:

**Proposal Number:** 106

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

Overall Ranking: Low -Medium -High

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

**Low for the Delta; minimal relevance to the Delta Region; refer to Sacramento River Region for rating.**

1. Is the project feasible based on local constraints?

Yes -No

How?

**I could not identify any local constraints that would impede the projects ability to move forward in a timely and successful manner.**

**Methods proposed are well documented and have been used extensively.**

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

Yes -No

How?

**Yes, even though the proposal does explicitly tie in the six multi-regional priorities it does refer to the three applicable strategic goal.**

**Goal 1 At Risk Species. Goal 3, Harvestable Species, and Goal 4, Habitats, and Goal 6, Sediment and Water Quality.**

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

-Yes No

How?

**&#61608; Proposal claims to focus on sediment quality. Sediments are a major sink for both metal and organic contaminants introduced into the aquatic systems and thus may be the most sensitive compartment in the aquatic system. Benthos accumulating these contaminants subsequently can harm sensitive species and subsequently harm fish such as salmon. Adverse impacts include reduced growth rates.**

**&#61608; Proposal claims to be able to guide future restoration and remediation actions.**

**&#61608; The application only briefly explains how it relates to past and future projects in the area, including other projects previously funded by the CALFED even though Dr. Alpers is one of the principal investigators for a currently funded Hg project for CALFED.**

**&#61608; It is unclear how the studys results will be used to help carry out a widely supported ecosystem restoration plan for the area. Other than identifying hot spots or further areas of concern regarding concentrations of metals in sediments, it isnt clear how information that will inform impending decisions by landowners, ecosystem restoration agencies, environmental regulators, or other policymakers.**

**&#61608; Work may have restoration and conservation consequences if it can identify hot spots. It, however, remains unclear how these data will actually guide restoration and management.**

**&#61608; Focus of study on base metals (i.e. Cd, Cu, Pb, Ni, and Zn.) Hg will also be analyzed**

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

-Yes XNo

How?

**The proposed project provides limited detail on a plan for local involvement.**

Other Comments:

**&#61608; Highly qualified researchers such as Dr. Ogle and Dr. Charles Alpers have the experience and perspective to ensure the success of this proposal.**

**&#61608; It isnt clear how applicable sediment toxicity test results for Hyllella, Chironomus, and Ceriodaphnia will be to conditions such as when sediment is mobilized during high flow events. A gap in the study appears to include an evaluation of the density of selected invertebrates in areas where these species may provide forage for juvenile salmon in areas such as the confluence of Stoney Creek and the Sacramento River.**



## Sacramento Regional Review:

**Proposal Number:** 106

**Applicant Organization:** Pacific EcoRisk

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

Overall Ranking:    Low    -Medium    -High

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

**This issue (accumulation of metals in upper River sediments) has not been identified as a priority water quality/aquatic biota concern. The principal source of metal loading to the upper River (Iron Mt. Mine) has been mostly addressed and the expectation is that sediment metal concentrations will decline over time.**

1. Is the project feasible based on local constraints?

Yes -No

How?

**Studies of metal concentration in sediments, sediment toxicity, benthic community structure, and bioaccumulation of metals in benthics will use standard, accepted protocols. Access to study sites should not be an issue.**

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

Yes -No

How?

**The project addresses the issue of ecosystem impacts from discharge of heavy metals from abandoned mines, as discussed in PSP Sac Region Restoration Priority #7.**

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

-Yes No

How?

**The project does not seem totally consistent with other monitoring and implementation efforts. Sacramento River monitoring as done by the SRWP did not identify metals accumulation in sediment and biota as a principal concern. Furthermore, remediation efforts at abandoned mine sites has been underway in recent years and metals loading from these sites has been substantially reduced (most notably from Iron Mt. Mine). Even if sediment metals (in the upper Sac. R.) had been identified as a significant problem (and it**

**hasn't), one would expect that the problem would lessen over time with the principal sources controlled.**

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

Yes -No

How?

**This type of monitoring/research study does not require major involvement of local communities or other institutions but should coordinate with stakeholder groups such as SRWP and Sacramento River Conservation Area.**

Other Comments:

**This issue (accumulation of metals in upper River sediments) has not been identified as a priority water quality/aquatic biota concern. The principal source of metal loading to the upper River (Iron Mt. Mine) has been mostly addressed and the expectation is that sediment metal concentrations will decline over time.**

# External Scientific: #1

## Research and Restoration External Scientific Review Form

Proposal Number: **106**

Applicant Organization: **Pacific EcoRisk**

Proposal Title: **Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed**

### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

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.**

<b>Overall Evaluation Summary Rating</b>	<b>Provide a brief explanation of your summary rating</b>
-Excellent	<b>On the positive side, the proposed work represents a proven approach to address the problems of contaminated sediment. If conducted, it will yield important results. The proposal did not however provide adequate detail of several aspects of study related to the urgency, design, implementation, analysis or interpretation of data collected. Other approaches such as measuring tissue levels in field-collected animals, or benthic biomass determination might be considered.</b>
XGood	
-Poor	

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

**I feel the goals, objectives and hypotheses stated in this proposal are straightforward and internally consistent. The authors propose a triad approach to determine the impact of contaminated sediments on benthic communities of the upper, freshwater portion of the Sacramento River. Sediment chemistry, benthic invertebrate community structure and sediment and pore water toxicity will be examined from various sites, including contaminant "hot spots" that will be identified as the project progresses. In addition, bioaccumulation of metals from contaminated sediment by a commonly-used oligochaete model species will be measured. This approach is frequently adopted in contaminant studies and can convey very**

real benefits to decision makers and aid in the understanding of potential contaminant effects. Unfortunately, it is difficult to fully judge the potential efficacy of this project because many details, e.g., the number of replicate benthic invertebrate samples, sieve sizes, the number and quality of reference sites in the basic sampling design and statistical analysis, are not provided.

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 authors refer to published and unpublished research that suggests that metals in the sediments in this region occur at high concentrations, and they present the results of some preliminary toxicity tests that demonstrate acute toxicity suggesting high levels of metals. I don't know this area and cannot state from prior experience that sediment contamination is common or severe enough to pose a significant risk. Presentation of sediment metal concentrations reported from the literature or a summary of existing information giving sediment metal values would better justify the proposed research and help convince me of the necessity of the study. The conceptual model, however, is clearly stated and understandable, and it is an appropriate starting place for this project. If metals pose a risk in the area, then examination of contaminated sediment effects on the benthos is easily justified and fully warranted for the reasons discussed in the proposal.

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 proposed approach is generally appropriate to meet the stated objectives. The project's methods are not novel and are not likely to lead to new methodologies or approaches, but the information generated on sediments may prove significant to understanding the ecological consequences of metal contamination. Sediments need to be considered when contaminants are studied, and effects on the benthos may lead to increased metal trophic transfer to predators such as fishes or changes in predator communities that rely on benthic biomass for food. The information will be of use to decision makers.

The proposed approach does not, however, cover all contingencies. Sediment toxicity of model species will be studied and no tests of the tolerance of fauna living in the river are planned. It is possible that biota living at the contaminated sites have adapted to the levels of contamination present either by a changes in species composition favoring tolerant species or by genetic adaptation and increased tolerance of some affected species. If so, benthic biomass may or may not be correlated with metal concentration. Furthermore, it is possible that the remaining biota will bioaccumulate metals at very high levels. This potential will not be modeled by bioaccumulation studies of animals (like oligochaetes) without a history of exposure to contaminants. The current experimental design cannot examine these questions. An alternative approach would be to directly sample tissues of specimens of benthic invertebrates collected in the field to measure bioaccumulation and, therefore, the potential for trophic transfer. And although not considered, estimation of benthic biomass might prove useful.

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 project is feasible and carries a high likelihood of success. The scale of the project 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?

**I feel that a number of performance measures will be available throughout the study. Each task will address the goals of the project and can be used to judge success. For example, toxicity tests will determine if sediments have the potential for influencing benthic biota, and community structure analysis will determine how metals might influence the community. However there is no mention of analysis techniques, which is unfortunate because the sampling design and data collected will be quite complex and multi-variate approaches to comparisons of community structure and correlations with environmental data will likely be required.**

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?

**It is very likely that project will lead to valuable products. The information gathered should identify sites that are contaminated and provide important information for decision makers.**

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 requisite infrastructure and expertise appear to be available among the team who will conduct this research. The authors have published in peer-reviewed literature suggesting their methods and techniques are sound. The authors document procedures that are appropriate for the proposed tasks.**

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

**The proposed research is expensive but the potential benefits are great. Nevertheless, the requested budget seems higher than I would have expected for the work to be conducted.**

**Miscellaneous comments:**

**none**

## External Scientific: #2

### Research and Restoration External Scientific Review Form

Proposal Number: **106**

Applicant Organization: **Pacific EcoRisk**

Proposal Title: **Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed**

#### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

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.**

<b>Overall Evaluation Summary Rating</b>	<b>Provide a brief explanation of your summary rating</b>
-Excellent	<b>This is a solid project using well developed methods that should provide important monitoring information to guide management/restoration efforts. Appropriate site selection during the first year of the project will be critical to the project's value for decision makers.</b>
XGood	
-Poor	

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

**An overall goal is not clearly stated as such. However, the hypotheses to be tested are 1) that metals in sediments in the upper Sacramento River are causing toxicity to benthic organisms and 2) that metals in sediments are resulting in bioaccumulation by benthic organisms to levels that are adversely affecting fish populations, particularly salmonids.**

**It is not clear in the proposal how hypothesis 2 will be tested.**

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?

**In general it is well recognized that sediments are an important sink for a variety of contaminants including metals and that benthic fauna can be a critical group in that they perform important ecosystem processes and are a major food source for higher trophic levels such as fish.**

**The primary justification for this proposal is actually a lack of existing knowledge. The applicants contend that there has been very little evaluation of the toxicity or bioaccumulation of metals in the upper Sacramento River watershed. However, information from activities in the area and/or loading estimates can be used to justify metals as a priority concern. In this case a history of mining activities, selected toxicity tests with field sediments and high metal body burdens in benthic invertebrates provide the justification for focussing on metals.**

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 approach involves collection of sediments from selected tributaries in the upper Sacramento River watershed. The sediments will be tested for toxicity and bioaccumulation using EPA protocols. Benthic community analyses will be performed at the collection sites and the metal content of the sediments and other physical/chemical attributes will be analyzed.**

**The sampling scheme will focus on suspected 'hot spots' from areas likely to be contaminated with metals. Details of sediment collection are referred to the Quality Assurance Project Plan of the USGS National Water Quality Assessment Program. Presumably these prescribe depth of sampling? What about treatment of the sediment prior to testing (e.g., oxygenation? Sieving? Etc.?).**

**Three different species will be used in the toxicity tests which gives added strength.**

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 scale of the project is well documented and because the approach relies on standard test methods the project is technically feasible. The scale of the project is such that at total of 30 sites will be sampled during the first year and on this basis 5 of the most contaminated sites will be chosen for more detailed analysis during the second year.**

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?

**A peer review panel will provide guidance and evaluate results after first year of the study. As far as the laboratory measurements it appears that the appropriate QA/QC measures are in place. In addition a detailed schedule of task performance and completion is provided (Table 1).**

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 main product arising out of this project would be an indication of the degree (concentration) and extent (in space) of sediment contamination with metals that could aid in management efforts. A database of the results will be publicly available on the web.**

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?

**Both of the project applicants are well qualified (full CVs attached) to conduct this work and have proven track records in the field. All of the necessary infrastructure is available to conduct this project.**

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

**This 3 year project has a total budget of \$833,469 (or \$829,511 on p. 11). Most of the requested funds are for salaries and consultant services. The third year of the project will be spent entirely on report preparation and project management (expensive?).**

**Miscellaneous comments:**

**My one concern with the project is the potential for confounding influences (particularly with regard to toxicity testing and benthic community analyses) of other (non-metal contaminants). It is unclear how such problems would be addressed. Also, how will the weight of evidence (tox, analytical chemistry, community structure) be combined?**



# External Scientific: #3

## Research and Restoration External Scientific Review Form

Proposal Number: **106**

Applicant Organization: **Pacific EcoRisk**

Proposal Title: **Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed**

### Conflict of Interest Statements:

I have no financial interest in this proposal.

**X**Correct

-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.**

<b>Overall Evaluation Summary Rating</b>	<b>Provide a brief explanation of your summary rating</b>
-Excellent	<b>This is a good solid study that should be funded. However, the applicants should attempt to rely less on laboratory measurements and more on measurements on field invertebrate populations so that their results will be as relevant as possible.</b>
<b>X</b> Good	
-Poor	

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

**The goals, objectives and hypotheses are clearly stated. Hypothesis H1 (metal toxicity to benthic animals) will be addressed by a combination of field and laboratory measurements. However, I did not understand how hypothesis H2 would be tested. In H2, the authors wish to determine if metals in benthic invertebrates are present at concentrations that are likely to adversely affect fish. I do not see how they will determine this because they will not be measuring metals in field invertebrate populations nor will they be feeding contaminated invertebrates to fish to see if this influences their well-being. How then will they determine if metals in invertebrates are likely to affect fish?**

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?

**Yes the study is amply justified. The applicants make a strong case that sediments can be an important repository for trace metals, which could in turn affect sedimentary invertebrates. Given that these invertebrates are a major food for fishes, as pointed out by the applicants, accumulation of metals by these invertebrates could have major repercussions on fish populations both because they would be a source of metals to fish and because their absence could reduce fish production. The conceptual model presented by the applicants is clear.**

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 approach is appropriate for meeting the objectives, in part because the applicants do not depend on a single approach (each of which is imperfect) but they propose using a weight of evidence approach with the results of several types of measurements. For example, porewater toxicity tests are in the eyes of this reviewer of little use because the speciation of metals is altered by sediment as well as by the introduction of oxygen into formerly anoxic porewaters. The results of such tests likely bear little resemblance to what animals experience in the field. In spite of these obvious flaws, they are currently part of the ensemble of tools used by environmental agencies. Thus their use in concert with other approaches could show their limitations and could contribute to the advancement of knowledge. I hope that the applicants will be critical in their use of each technique and use the resulting data to advance our knowledge about the relative merits of each approach. The other tests suggested by the applicants are somewhat less contentious. I wondered that the applicants did not choose to measure metals in field animals. If the same types of animals could be found at most sites, metal measurements in these animals would give very realistic information about their exposure to sedimentary metals that would be complementary (and probably more meaningful) than those that will be provided by the oligochaete laboratory bioaccumulation tests.**

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 approach seems quite feasible and the applicants have the necessary experience to carry out the study. There is high likelihood of success. The scale of the project appears to be 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?

**I am not sure that this is relevant to the present application.**

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?

**Yes, the information generated by the applicants should be useful to assessing the spatial distribution of metal contamination in the area. However, fewer lab measurements (e.g., porewater toxicity tests) and more field measurements (e.g., bioaccumulation in native invertebrates) would make the results more useful.**

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 have a good track record and should be able to effectively carry out the proposed research.**

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

**The type of work proposed does not come cheap and thus the budget seems reasonable.**

**Miscellaneous comments:**

# External Scientific: #4

## Research and Restoration External Scientific Review Form

Proposal Number: **106**

Applicant Organization: **Pacific EcoRisk**

Proposal Title: **Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed**

### Conflict of Interest Statements:

I have no financial interest in this proposal.

Correct

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.**

<b>Overall Evaluation Summary Rating</b>	<b>Provide a brief explanation of your summary rating</b>
<input checked="" type="checkbox"/> Excellent	<b>.although Very Good might be a better rating. This project is the type of research that is needed to assess the effects of metals on biota. There is a real need to address the links between contaminated sediments and actual effects or bioaccumulation. The PIs will need to show that the toxicology tests, especially with regard to bioaccumulation, are directly transferable to the field.</b>
<input type="checkbox"/> -Good	
<input type="checkbox"/> -Poor	

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

**The PIs present a clear set of goals and have also developed hypothesis-driven research. These goals are internally consistent with respect to their attempt to assess toxicity and potential bioaccumulation of metals in benthic organisms. Benthic organisms are key food resources for fishes of the Bay-Delta and watershed. A loss due to toxicity or accumulation and food web transfer are both concerns for the health of this ecosystem.**

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?

**There is a good amount of research that has been completed on the toxicological effects of metals and this project should prove a good addition to the literature. It involves toxicity testing in a region that has high levels of contamination. This research project attempts to use biological endpoints as measures of contamination. This is a creative and timely proposal.**

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 is an interesting approach to assessment of sediment contamination, specifically to the use of aquatic organisms as measures of bioaccumulation and/or toxicity. The PIs must be able to clearly interpret their results to the resident benthic population at specific study sites. I would encourage collection of similar organisms in the area to basically ground-truth their toxicological study. They mention this as a possible sidelight, but I think that its incorporation is imperative.**

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?

**As documented, this project is very feasible and will yield interesting results. If similar organisms are used at each site for sediment toxicity, it will allow for comparison of the bioaccumulative metals among different sites. If there are no benthic organisms at a given field site, it may be difficult to assess cause and effect without this approach. The PIs may consider additional spiking of sediments with stable isotopes of different metals for uptake studies.**

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?

**The details of the work schedule is intended to serve the purposes of performance measures, but it gives little indication of what a success is defined as and how that will affect the next steps in the research. The PIs need to revise this section prior to funding. What is the QA performance 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?

**As is consistent with other academic research projects, this proposal will produce reports and peer-reviewed publications. The PIs really need to describe how their results will be used. Will the results target the need for additional studies of food web transfer? Are these organisms white mice or can they be better seen as fish food for resident biota? What will the management benefits be?**

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 PIs seem well-qualified to conduct this research. It teams an ecotoxicologist with a geochemist who has vast field experience. They have the necessary infrastructure for this type of research.**

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

**This is a reasonable project for the funding level. Having the lab director of the toxicology consulting firm is a real plus and will probably allow flexibility of project direction.**

**Miscellaneous comments:**

## **Environmental Compliance:**

**Proposal Number:** 106

**Applicant Organization:** Pacific EcoRisk

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

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

-Yes No

If no, please explain:

**The methodology was not described, but if the applicant will be disturbing sediment in the riverbed, he should consult with CDFG to determine if a 1601 is required. Because a federal agency is an applicant, consultation is required to determine if this is a project under NEPA.**

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

-Yes No

If no, please explain:

**Funding and time were not allocated to permit applications and permit fees.**

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

Yes -No

If yes, please explain:

**The applicant must obtain the proper permits. If they do so, the project is feasible.**

Other Comments:

## **Budget:**

**Proposal Number:** 106

**Applicant Organization:** Pacific EcoRisk

**Proposal Title:** Assessing the Toxicity and Bioaccumulation Impacts of Metals-Contaminated Sediments in the Upper Sacramento River Watershed

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

Yes -No

If no, please explain:

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

Yes -No

If no, please explain:

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

Yes -No

If no, please explain:

**MAYBE - explanation on the last page of the Budget Justification is cryptic.**

4. Are appropriate project management costs clearly identified?

Yes -No

If no, please explain:

**MAYBE - Details seem to be contained on various lines of the attached Budget Detail. (pg. 15 & 16)**

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

-Yes No

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



**17.a. \$743,593.00**

**Couldn't find a corresponding figure.**

6. Does the budget justification adequately explain major expenses?

Yes No

If no, please explain:

7. Are there other budget issues that warrant consideration?

Yes No

If yes, please explain:

Other Comments: