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[www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov)

March 23, 2005

Paul Ward,  
California Department of Fish and Game  
Re: CALFED Monitoring PSP

Dear Mr. Ward:

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Butte Creek Spring Run Chinook Salmon monitoring activity between Sacramento River Miles 81 and 138 in Butte, Glenn, and Sutter Counties. This project is listed as Project # 51 in the "Project Tracker" system on our website at: [www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov). Please keep this project updated as it progresses.

On February 1<sup>st</sup>, 2005, you presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

On March 17, 2005, the project was presented to the SRCA Forum Board of Directors and was found to be consistent with the principles and guidelines of the SRCA Forum Handbook with no objections noted at this time.

We appreciate the effort your organization has made in bringing these projects to the Forum and your recognition of the value of the principles and guidelines of the Handbook. We look forward to your continued coordination with SRCAF and the local contacts on this project as well as any future project proposals.

Sincerely,

Burt Bundy, Manager  
SRCA Forum

Cc: CALFED ERP Monitoring PSP



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March 23, 2005

Stan Allen,  
Pacific States Marine Fisheries Commission  
Re: CALFED Monitoring PSP

Dear Mr. Allen:

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Chinook Salmon Escapement monitoring activity between Sacramento River Miles 165 and 302 in Shasta and Tehama Counties. This project is listed as Project # 56 in the "Project Tracker" system on our website at: [www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov). Please keep this project updated as it progresses.

On February 1<sup>st</sup>, 2005, Doug Killam presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

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Sincerely,

Burt Bundy, Manager  
SRCA Forum

Cc: CALFED ERP Monitoring PSP



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March 23, 2005

James Smith,  
US Fish and Wildlife Service  
Re: CALFED Monitoring PSP

Dear Mr. Smith:

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Clear Creek Anadromous Salmonid monitoring activity between Sacramento River Miles 289 and 290 in Shasta County. This project is listed as Project #73 in the "Project Tracker" system on our website at: [www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov). Please keep this project updated as it progresses.

On March 1<sup>st</sup>, 2005, Matt Brown presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

On March 17, 2005, the project was presented to the SRCA Forum Board of Directors and was found to be consistent with the principles and guidelines of the SRCA Forum Handbook with no objections noted at this time.

We appreciate the effort your organization has made in bringing these projects to the Forum and your recognition of the value of the principles and guidelines of the Handbook. We look forward to your continued coordination with SRCAF and the local contacts on this project as well as any future project proposals.

Sincerely,

Burt Bundy, Manager  
SRCA Forum

Cc: CALFED ERP Monitoring PSP



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tel (916) 449-2850  
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nature.org

May 5, 2005

Dan Ray, Grants Officer  
California Bay-Delta Authority  
Ecosystem Restoration Program  
650 Capitol Mall, 5th floor  
Sacramento CA 95814

**RE: Comment on ERP Proposal, *The COYOTE Project: a Unified Approach to Monitoring Floodplain and Freshwater Tidal Marsh Restoration in the Cosumnes Preserve and Yolo Bypass***

Dear Mr. Ray,

The Nature Conservancy (TNC) welcomes this opportunity to comment on the California Bay-Delta Authority (CBDA) Ecosystem Restoration Program (ERP) Monitoring Proposal: *The COYOTE Project: a Unified Approach to Monitoring Floodplain and Freshwater Tidal Marsh Restoration in the Cosumnes Preserve and Yolo Bypass*. TNC is a collaborator with the COYOTE team on this monitoring proposal. TNC cooperatively manages the Cosumnes River Preserve with several agencies and stakeholders (Bureau of Land Management, California Department of Fish and Game, California Department of Water Resources, Sacramento County, Ducks Unlimited), and is a long-time collaborator with the University of California at Davis (UC Davis) for research and adaptive management at the Preserve. We reviewed the recommendations of the selection panel and provide the following comments.

The external reviewers praised the proposal's multi-disciplinary approach, the conceptual model of hydrologic connectivity as the driver of floodplain and wetland systems, the team's technical expertise, and the use of TNC's performance measures methodology. One criticism from the technical review panel was a perceived lack of performance measures for hydrologic connectivity. At the Cosumnes River, studies by UC Davis have highlighted several potential indicators of connectivity, such as amount of land inundated at different flood recurrence intervals (e.g. 2-to-5 years) before and after levee manipulation, as well as timing (seasonality), duration and depth of inundation. These indicators link to hydrologic processes (flood flows), geomorphology (levees, channel incision, sediment deposition on the floodplain), and biological responses (fish use of inundated areas, tree recruitment on floodplains). The revised proposal will make this more explicit.

This work is necessary to support adaptive management of the lands restored so far, as well as to guide additional restoration at Cosumnes and other floodplains in the CBDA program area. We plan to work with the research team to ensure that monitoring findings are incorporated into

improved management and restoration at the Preserve. Earlier findings of the Cosumnes Research Group have already been used to prioritize land acquisition and to develop restoration strategies for other sites along the Cosumnes River, including lands owned by CDFG or purchased with CBDA funds. The proposed monitoring will complement and directly support implementation of the CBDA-funded Cosumnes River Preserve Management Plan, which is currently under development.

In conclusion, CBDA has made substantial investments in the protection, restoration, and research of the lower Cosumnes River and its floodplain. The Cosumnes River Preserve is a signature site for the ERP and is widely known for its innovative and extensive restoration efforts. Studies funded by CBDA and others have yielded a wealth of information on the ecological function and responses of floodplains, wetlands, priority species including native fish, and riparian forest. The adaptive management process embraced by the ERP calls for CBDA to fund monitoring of the past investments made in conservation and restoration of the Cosumnes River. An investment in monitoring of the Cosumnes, coupled with the Yolo Bypass, will pay great dividends in improved understanding and management of the floodplain systems that are so critical for priority CBDA species.

Sincerely,  
The Nature Conservancy

A handwritten signature in cursive script that reads "Ramona Swenson".

Ramona Swenson, Ph.D.  
Ecoregional Ecologist

cc: Professor Jeff Mount, UC Davis  
Dr. Ted Sommer, DWR



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WATERSHED HYDROLOGY & GEOMORPHOLOGY LAB  
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DAVIS, CALIFORNIA 95616

April 14, 2005

Dan Ray, Grants Officer  
California Bay-Delta Authority  
Ecosystem Restoration Program  
650 Capitol Mall, 5th floor  
Sacramento CA 95814

To the CALFED ERP Proposal Selection Review Panel:

I would like to provide feedback concerning the review of the proposal I submitted for funding consideration entitled, "Hypothesis-driven Monitoring of the CALFED/CVPIA Sponsored Gravel Augmentation on the Lower Mokelumne River". The purpose of this feedback is to provide clarifying comments for the public record. The personal attacks written by one external technical reviewer were shocking. They are inconsistent with both the spirit of merit-based evaluation and the facts of the PI's track record in community involvement, professional involvement, and scientific publication.

The selection panel's summary review paragraph includes several sentences that are factually incorrect. The next 4 paragraphs present clarifying comments drawing only on proposal materials that demonstrate the facts of the situation.

The panel stated that the "model" used in the proposal is "unvetted and non peer-reviewed". This claim is false. In fact, the proposal cites 5 peer-reviewed scientific articles about SHIRA. In that formal review process, each article was reviewed by 2-3 independent, anonymous scientists as well as a scientific editor governing the publications. Informally, each article has also been reviewed by several colleagues in the disciplines of ecology and hydrology, including graduate-student advisory committees, where applicable. As a matter of public record SHIRA is at present the most scientifically peer-reviewed framework for spawning habitat rehabilitation in existence.

The summary paragraph claims that the SHIRA framework is not applicable to other streams within CALFED's domain. This claim is false. In fact, the proposal states that SHIRA has already been used on the Trinity and Yuba Rivers as well as Mokelumne River, so the applicability is already demonstrated. The universal laws of physics that are incorporated into the mechanistic model used in SHIRA apply to all regulated river reaches at the base of dams in California. If one identified a situation in which a different model would work better than the FESWMS model used thus far, the modular nature of SHIRA illustrated in the proposal allows for the substitution of whatever mechanistic model the design/evaluation team desired to use. Thus, the modular nature of SHIRA and the use of adaptive management, as reported in the proposal, preclude the possibility of non-transferability.

The summary paragraph claims that there is no clear connection to key species of concern to the CALFED/ERP program. This claim is false. Priority 3 of the ERP draft Stage 1 plan for the San Joaquin region calls for improved rearing and spawning habitat for chinook salmon in San



Joaquin tributaries, of which the Mokelumne is one. Similar priorities have been stated by ERP for the entire Central Valley. The proposal addresses exactly this priority- it includes monitoring of chinook spawning, spawning habitat quality, and chinook rearing. The proposal goes further and aims to use monitoring data to develop a framework for predicting habitat and utilization heterogeneity, which one technical reviewer notes is an important remaining question to address with monitoring data.

The summary paragraph claims that there is no connection (clear or otherwise) to the bigger picture of gravel restoration efforts across the landscape or the Central Valley. The claim is false. The proposal presents a hierarchical framework for conceiving of gravel restoration for any stream and then implements that framework for both restoration design and again for evaluation. Two technical reviewers specifically applauded this aspect of the proposal. Furthermore, this proposal is the first of any document related to gravel augmentation in the Central Valley to show evidence demonstrating that as much as 50% of the gravel volume placed into a stream may be lost due to in situ processes. The significance is that the current methods CALFED is using to evaluate gravel restoration outcome do not account for this process and thus are unlikely to correctly identify and interpret project fate.

The summary paragraph claims that it is unclear how the monitoring data produced would be useful to resource managers. This claim is false. Included in the proposal is a letter of support from the resource manager responsible for the lower Mokelumne River, EBMUD, indicating that they support the proposal. The proposal states that EBMUD has used the monitoring data collected so far as well as the SHIRA framework to implement their gravel restoration projects in 2001, 2002, 2003, and 2004. It also states that EBMUD has used the sediment budget reported in the proposal as a guide to its future gravel augmentation volumes. Thus, the monitoring data already is of use to the resource manager and their letter indicates that they will continue to use the products of our monitoring activities.

Of the 3 external technical reviews, two report minimal criticism of the proposal. These two state that the work is well justified and the hypotheses clearly explained. Contrary to the first sentence of the review panel paragraph, one states that "methodologies proposed are appropriate and proven to meet the study's objectives", while the other states that "data collection procedures and timing are reasonable given project goals." Both of these reviewers find that the proposed budget is fully justified, with one even noting that the cost of the RTK GPS is fully justified by the high-resolution monitoring data that will result. Both state that the PI is fully qualified to perform all aspects of the project, especially with the aid of a PhD biologist and PhD geomorphologist in the form of 2 postdoctoral researchers included in the proposal.

In sharp contradiction to the general consensus, one external technical reviewer blasts the PI personally and nuked the proposal. Many claims made by this reviewer are false. Seven of these are carefully refuted below. Other claims by this reviewer are highly problematic, but are too numerous to address point by point. Shockingly, the reviewer included many highly personal attacks that were highly inappropriate. The PI has collaborated with many scientists, resource managers, and stakeholders locally, nationally, and internationally. The PI was awarded a special Certificate of Appreciation by the Maryland Department of Natural Resources for outstanding research, management assistance, and knowledge transference. He was also awarded a special recognition for research and community involvement by the stakeholder group Otter Point Creek Alliance.

First, the reviewer claims that there is an undisclosed cost of \$173,000 for macroinvertebrate analysis. This claim is false. The proposal states that a **biologist** with a PhD will be hired for the 3-



year study. Table 2 in the proposal illustrates that the field sampling and laboratory analysis of the macroinvertebrates will be performed by the post-doctoral biologist. Thus, no such undisclosed cost associated with sending out samples for external analysis at \$200 per sample exists.

Second, the critical reviewer claims that the PI has not taken prior criticisms seriously and has ignored external input, specifically with regard to incorporating biological monitoring into the proposal. This claim is false. This proposal includes the most extensive biological monitoring program for any spawning habitat rehabilitation project on a regulated river in the Central Valley of California. The proposal states that a PhD biologist will be directly involved in biological monitoring in this project, including monitoring of spawners, redds, juveniles, and macroinvertebrates at rehabilitation sites. Also, EBMUD has submitted a letter of support for the proposal in which they state that they will share all of their monitoring data for use in this project. Their monitoring data is listed in Table 1. As indicated in the proposal, Dr. Joe Merz, a fish biologist at EBMUD has been a collaborator with the PI in developing and evaluating SHIRA and would continue in this capacity. Thus, two PhD biologists will be involved in the proposal along with the PI and 1 PhD geomorphologist. The PI himself has published articles on ecology in journals ranging from *Wetlands* to *Canadian Journal of Fisheries and Aquatic Science*, and is widely recognized as an interdisciplinarian.

Third, the critical reviewer states that the modeling results have not been validated. This claim is false. Every 2D hydrodynamic model of pre- and post- project conditions ever run on the Mokelumne River has been field validated, with examples of this presented in the proposal, notably on page 10 where model uncertainties are presented. Two peer-reviewed scientific journal articles cited in the proposal (Pasternack et al., 2004 and Wheaton et al., 2004) present independent model validation data. In terms of spawning habitat predictions, Figure 14 of the proposal is a direct test and validation of the 2D model's predictions of habitat quality: as stated in the proposal, 95% of redds are located on points predicted to be medium and high quality habitat. Shear stress predictions by the model have been field validated by measuring vertical velocity profiles (see page 10). Even eddy viscosity has been field validated. So there is no variable used in the model that has not been validated through direct field-based testing.

Fourth, the critical reviewer directly and personally attacks the PI's scientific integrity by stating that the PI ignores uncertainty and model limitations and blindly advocates for his approach. This claim is false. On page 10 of the proposal a paragraph presents the results of analysis of model uncertainty and error propagation. Obviously, all approaches have limits and uncertainties. The proposal reports in the prior-studies section that through extensive monitoring, data analysis, and modeling, the PI has made an extensive effort to quantify sources and magnitudes of uncertainty. The proposal aims to take this even further with highly detailed analyses at 3 spatial scales. However, no matter how much work is done, uncertainty cannot be exterminated, but management must move forward. SHIRA uses adaptive management as an aid to handling uncertainty.

Fifth, the critical reviewer cites the problem of "attractive nuisance" of gravel restoration projects and claims that data results on this topic are not presented. This claim is false. On page 10 there is a paragraph dedicated to this issue that presents both data and a citation to a peer-reviewed scientific journal article co-authored by the PI that addresses this issue.

Sixth, the critical reviewer cites project lifespan as the most critical question and states that an assessment of long-term vs. short-term benefits for projects is clearly warranted in the proposal. Exactly such an assessment is in fact proposed. The proposal offers a hierarchical framework for monitoring geomorphic changes over three spatial and temporal scales for 3 additional years (bringing the total dataset to 10 years). This is the most that can be achieved given that the PSP calls





for a maximum of 3 years of monitoring. If completed, this would be the highest-resolution 10-year monitoring dataset ever collected for a gravel placement project.

Seventh, the critical reviewer states that the proposal does not directly monitor scour. This claim is false. The proposal states that painted tracer cores will be used to monitor scour. This method has already been used on the Mokelumne and is widely published elsewhere as an effective approach to quantifying scour. Scour chains are suggested, but contrary to the reviewer's claim they do not isolate scour from fill, since both processes can occur simultaneously. DEM differencing is at least as valid as scour chains for this reason. The tracer cores do isolate the effects because filled sediment will not be painted, and thus are distinguishable.

As a final point, I note that there are two errors in the prior-phase funding review. First, as a co-PI on the CALFED project entitle, "McCormack-Williamson Tract Restoration Planning, Design and Monitoring Program I", I independently submitted my final report to CALFED and published it on the internet for the public within the contractual period, whereas the review only notes that the entire final report of all components was submitted to CALFED 16 months late. Second, the review claims that I underestimated the budget of the initial SHIRA demonstration project funded by CALFED by \$42,000. This claim is false. The truth is that there was a discrepancy between federal and state overhead rates, which created a misunderstanding. I offered to move forward with the reduced award, but Gonzalo Castillo of CALFED requested that I perform additional work, including high-flow 2D modeling of the Mokelumne River in support of potential pulse flow releases. On the basis of performing that additional work and developing a comprehensive outreach website, I accepted the additional \$42,000 to augment the project.

In summary, I appreciate the opportunity to address the outcome of the proposal review process in the public record. I hope that my comments will be thoroughly considered, even if the funding decision remains unchanged. I believe that it is a loss to CALFED that the only independent, academic, and peer-reviewed adaptive management experiment for restoring Central Valley gravel-bed streams will now be terminated due to lack of funding.

Sincerely,

A handwritten signature in cursive script that reads "Gregory Pasternack".

Dr. Gregory Pasternack  
Associate Professor  
Department of Land, Air, and Water Resources



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March 23, 2005

**James Smith,**  
**US Fish and Wildlife Service**  
**Re: CALFED Monitoring PSP**

**Dear Mr. Smith:**

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Juvenile Winter Run Chinook Salmon monitoring activity between Sacramento River Miles 243 and 244 in Tehama County. This project is listed as Project # 57 in the "Project Tracker" system on our website at: [www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov). Please keep this project updated as it progresses.

On February 1<sup>st</sup>, 2005, Tom Kisanuki presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

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Sincerely,

**Burt Bundy, Manager**  
**SRCA Forum**

**Cc: CALFED ERP Monitoring PSP**



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March 23, 2005

Michael Harris,  
Western Shasta Resource Conservation District  
Re: CALFED Monitoring PSP

Dear Mr. Harris:

The Sacramento River Conservation Area Forum welcomes the opportunity to comment regarding your CALFED Monitoring PSP that recently came before our organization. The project involves a Lower Clear Creek monitoring activity between Sacramento River Miles 289 and 290 in Shasta County. This project is listed as Project #75 in the "Project Tracker" system on our website at: [www.sacramentoriver.ca.gov](http://www.sacramentoriver.ca.gov). Please keep this project updated as it progresses.

On March 1<sup>st</sup>, 2005, you presented this project to our Technical Advisory Committee for review and comment. The project was determined to be consistent with the principles and guidelines of the SRCA Forum Handbook and was forwarded to the SRCAF Board of Directors with that recommendation.

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Sincerely,

Burt Bundy, Manager  
SRCA Forum

Cc: CALFED ERP Monitoring PSP

May 2, 2005

Dan Ray, Grants Officer  
California Bay-Delta Authority  
Ecosystem Restoration Program  
650 Capitol Mall, 5th floor  
Sacramento CA 95814

**Subject: ERP Proposal- California State University, Sacramento; Effects of structural enhancement on salmonid spawning submitted by Tim Horner**

Dear Mr. Ray,

Dr. Tim Horner, CSUS, recently submitted a proposal to the CALFED ERP. I am in strong support of it, not only because the information would be beneficial to Chinook salmon spawning habitat enhancement I am responsible for on the Mokelumne River but because it has excellent merit.

I was quite surprised to see that it was not recommended for funding and that it received a "moderate" review score. Specifically, I would like to point out several aspects of the final reviewer's comments that are contrary to the overall External Review.

***1) Specifically, the final review stated that all three external technical reviewers noted significant problems with study design, including the lack of suitable controls.***

Rebuttal: In fact, the second reviewer states that the proposal, "...does an excellent job presenting theory, developing a conceptual model...using hypotheses that will be directly testable...linkage is explicit and clear". "Approach is well designed and appears to directly build upon field methods developed in previous investigations".

***2) The overall synopsis states that "A major downfall of the study was that the authors were not able to make a strong case for how the insights gained from the study could be used by decision makers..."***

Rebuttal: According to the Draft CALFED Gravel Augmentation Panel Report (Section 7.1.2. Knowledge Gaps), "Although much is known about what comprises suitable spawning habitats from a structural and hydraulic perspective, there are several little understood factors that may under some circumstances significantly influence gravel use by salmonids. First, although cover type and availability have been postulated as key factors influencing gravel use, there have been no definitive studies conducted to test these hypotheses. Cover type and availability could be important factors in large scale gravel augmentation plans, where opportunities exist for linking cover elements (e.g. boulder clusters, large woody debris (or LWD), root wads, etc.) into gravel augmentation concepts".

Therefore, the proposal stems directly from a request by CALFED to study this subject. The placement of structures is expensive and time consuming, yet little is know about how it influences spawning adults. This suggests there is a strong case for such a study and this is clearly stated in the proposal. If woody debris and boulders are not beneficial to spawning adult fish, they should not be incorporated into spawning enhancement sites. This information appears to be very important to decision makers.

***4) Finally, the final review stated that the project team's... "track record for publication (beyond gray literature) and outreach is very limited"***

Rebuttal: Considering both authors have published in such journals as: Regulated Rivers, Canadian Journal of Fisheries Management and Aquatic Sciences, Transactions of the American Fisheries Society, and the Geological Society of America, I wonder what is an acceptable publication to this person?

Mr. Ray, it is important to note that the proposal seeks to hire two graduate students to perform the study. It seems somewhat strange that the final reviewer seeks a level of study detail of this magnitude before an initial assessment can be made. The students will have to submit a study proposal to their advisory committee which must then accept it. It would be improper to create the entire monitoring protocol without them. Furthermore, I do see this level of detail provided in other recommended proposals. Considering CALFED has spent over \$25 million on salmon spawning habitat enhancement, including the placement of structure without fully understanding the consequences of it, I sincerely hope the proposal might be reconsidered within the present budget cycle. Please feel free to contact me if you have any questions.

Sincerely,



Joseph E. Merz, Ph.D.  
East Bay Municipal Utility District  
Fisheries and Wildlife Office  
1 Winemasters Way Suite K2  
Lodi, California 95240



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May 1, 2005

Selection Panel  
CBDA, Ecosystem Restoration Program  
**Attention:** Dan Ray, Grants Officer  
650 Capitol Mall, 5th floor  
Sacramento, CA 95814

Dear Members of the Selection Panel;

We wish to thank the committee for the consideration given to our proposal entitled "Monitoring responses of the delta smelt population to multiple restoration actions". We are also grateful for the many helpful comments, and agreeing to consider a revised proposal. We are writing to provide clarification on 6 key areas that were of concern to the committee, and seek additional guidance for revision of the proposal.

1a. *General Approach*: "... consideration of a somewhat narrow set of potential mechanisms...". First, we certainly did not intend to give the impression that the project would disregard important factors. Overall, we proposed to integrate information from fish otoliths and histopathology to measure the condition of individuals sampled in the ongoing fish monitoring programs. Our overall goal has been to implement this approach as a screening-tool to establish annual baselines of measurements on individual growth processes and their causes, primarily feeding success and exposure to pesticides. In our experience, these are the two most likely ways in which current restoration actions would influence delta smelt vital rates, and they are important factors influencing overall growth-related survival: a key component of recruitment success. Measurements on how fish vital rates are affected by growth-related processes stand-out as primary gaps precluding the accurate evaluation of entrainment effects by the export facilities and potential benefits of restoration actions on the delta smelt population.

We are aware that several other factors can also influence growth, or can be important influences on delta smelt abundance. However, it is not practical or logistically feasible to measure everything at the same time, particularly factors such as competition and predation which can be major influences on growth-related survival. Developing annual baselines on growth-related processes would provide a backbone for an iterative process of eliminating key processes from consideration, and then focusing on the ones that appear important in different regions and from year to year. For example, if annual growth rates, histological condition, and mortality rates are all high and export losses are low, then it is much more likely that some catastrophic or unusual event such as predation by exotic fishes was an important factor limiting

abundance in that particular year. With such a large number of specific possibilities influencing delta smelt in any given season or year, this is a pragmatic way of identifying and eliminating categories of processes (based on how they influence fish vital rates) before further diagnosis.

1b. *Sampling design.* In a proposal revision we will further attempt to clarify using general scenarios for how sub-sampling of available smelt will occur, however, the nature of the problem is akin to following a moving target. Our approach blends traditional methods of monitoring and research into a single program that attempts to adapt in near real-time to an ever-changing “natural experiment”. The investigator can never be certain of the abundance and or distribution of fish in any one year, or often season, “a-priori” to set a specific experimental design as in traditional hypothesis testing.

2. *Samples from the export facilities.* We welcome this recommendation. We have often proposed using “salvaged” fish within our general approach in various CALFED workshops, and only deemphasized their use in the current proposal because the focus of the PSP was to address restoration actions.

3a. *Elimination of Task 3: histopathology and lab exposures.* We strongly request that the histopathology component of this project be included in a revised proposal, and will search for alternative funding for the bioassay work. Removal of histopathology from the proposal, in our view, would be a serious set-back to the success of this project. Our work in this area for delta smelt has undergone about a decade of design, testing, and peer-review in a variety of CBDA forums, professional conferences, and the scientific literature. We agree with the textbook description of histopathological responses provided by one Technical Reviewer, as we have successfully employed this technique and worked with various mechanisms of response on a variety of fish species for over 15 years. Overall, the current state of our knowledge indicates that most histological responses in delta smelt arise primarily from two main processes: poor feeding success and exposure to toxic chemicals, primarily dissolved pesticides. In our past experience, glycogen levels have been a straightforward indicator of feeding success in young striped bass and delta smelt, while a variety of other alterations to the liver are used to diagnose exposure to contaminants. Again as in 1a, we initially use this technique as a screening-tool, but if a large proportion of fish in the samples exhibit liver alterations consistent with toxic exposure, we typically apply complementary biomarkers that can distinguish among classes of contaminants (e.g. P450, or apoptosis methods; see our website for a full listing: <http://www.bml.ucdavis.edu/peeir/>), and or collaborate with other work programs (e.g. water quality) to identify potential sources.

Effects from other contaminants are possible but unlikely for delta smelt. For example, the Technical Reviewer also correctly indicates that PAH compounds are prevalent in the *sediments* of the estuary and they elicit similar histopathology responses. However, delta smelt are a *pelagic* species occurring only in the northeastern estuary and Delta where the dominant sources of contamination are *dissolved* pesticides. In addition, infestations are also a possible response, however, no evidence or hypotheses concerning such effects have ever been suggested. Delta smelt do act as hosts for a tapeworm also common in a variety of co-occurring fish species. Although, we typically observe and enumerate these in the digestive tract of delta smelt, thus far their occurrence does not appear to be associated with histological condition or fish growth rates. Thus they are most likely a natural occurrence unlikely to drive population abundance.

Bioassays were proposed as a way to strengthen the level of understanding of the histological responses, and indeed would help to address concerns over histopathological responses. First, our objective would be to identify potentially specific responses from exposure to pyrethroids, a new class of pesticide whose application is currently expanding, and then to fine-tune the temporal component of glycogen gain or loss to more accurately tie the temporal component of responses with the chronology of fish growth and location as determined from the otoliths. As described in response 1a (above) we can't measure everything and it doesn't make sense logistically to investigate other sources of contamination until we consider the most likely suspects first, before chasing-down others. We feel the proposal is stronger with the bioassays, however, we will accept the committee's recommendation and look for funds elsewhere for this component.

3b. *Sample sizes.* We proposed to examine about 100 fish from each of five surveys; a total sample size of 500 fish per year of work. First, we must consider that delta smelt are a threatened species currently at low abundance, such that we will be fortunate if 100 fish are collected at each, and especially the older life stages by the monitoring programs. In addition, delta smelt are typically patchily distributed. For example, currently the majority of the population is located in the lower Sacramento river, such that 100 samples from each of five life stages would provide a sufficient measure of fish response to the prevailing habitat conditions in that region. Finally, logistically speaking, this is a considerable amount of work. Rarely when using these techniques separately are sample sizes of 500 fish per year achieved.

6. *Equipment costs.* We definitely need to purchase a microscope and polishing equipment for a project of this magnitude. In our previous work we either borrowed or rented microscopes which interfered with work efficiency. Polishing tools were also limited and now in serious need of upgrading. We will keep such costs within the amount recommended by the committee.

Again, we thank the Selection Panel for the helpful comments. Given our response, we ask if a revised proposal retaining the histological component, removing the bioassay component, and otherwise addressing all other specific concerns, be an appropriate scope of work? We are willing to fit within the recommended funding allocation, although this will most likely compromise the scope of the project to a two-year investigation.

Sincerely,



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