Selection Panel Review Summary

Proposal No.: 007
Proposal Title: What are the optimal environmental conditions for Longfin Smelt reproduction?
Principal Investigator: James Hobbs
Amount Requested: $ 604,962.00
Recommended Amount: $0

Summary: The proposed project is a 3-year study to develop aquaculture techniques for the threatened longfin smelt and examine the effects of salinity and temperature on development, survival, growth and condition of longfin smelt in culture.

Assessment: The proposed research would likely fill existing basic knowledge and understanding on longfin smelt culture methods, information on biomarkers of temperature and salinity stress, and maternal contribution vs. environmental influence on otolith core chemistry. It builds upon ongoing research and the research team has been successful in the past. The proposal is poorly written and does not include clearly stated hypotheses nor does it have much application to management or conservation. It does not appear that the applicants addressed concerns raised in the Delta Science Panel reviews. Additionally, there are some technical concerns including whether the researchers will be able to culture the longfin smelt for the intended purpose of this proposal making this a high risk project.

Delta Science Program
2010 PSP Final Review Panel Meeting
January 19-20, 2011

2010 Final Review Panel – Summary of Review

Proposal # 127

Proposal Title: Basic Biology of the Longfin Smelt: Effects of Salinity and Temperature on Longfin Smelt Spawning, Growth and Survival in a Laboratory Culture

Lead Primary Investigator: James Hobbs

Applicant Organization: University of California, Davis

Amount Requested: $547,937

Panel Findings:

Relevance to Topic Areas: This project proposes to develop "to develop a better understanding of the range of suitable environmental conditions for longfin smelt reproduction, development and growth under laboratory conditions."

Quality of the Proposed Research: Both the external reviewers and the Panel agreed that information on longfin smelt is sorely lacking, however, this proposal had several problems that rendered it unfundable. First, and of utmost importance is that there is insufficient documentation that the PI's can capture, hold and raise longfin smelt, when all of the lab work in the proposal is dependent on having sufficient smelt for analyses.

There were other issues noted by the Panel including concern that factors other than salinity and temperature affect spawning and longfin smelt biology. There were no details on where or how longfin smelt will be collected. The hypotheses were not testable but general statements/questions regarding what the PI's will do.

A pilot study of culturing methods would have enabled reviewers and panel to have greater confidence that the PI's would be able to provide fish for the lab studies.

Both external reviewers and the Panel commented on structural problems in the proposal such as a lack of clarity, spelling errors, missing citations, and a general lack of attention to detail.

Main Summary Comments of Reviewers: The external reviews were split on their overall assessment, although important shortcomings were identified by both reviewers. Even the reviewer who rated the proposal as above average pointed out that it will be very difficult to hold and culture smelt.

Funding Category: Inadequate

Proposal Number:	0127
Proposal Title:	Basic biology of the longfin smelt: Effects of Salinity and Temperature on Longfin Smelt Spawning, Growth and Survival in a Laboratory Culture.
Proposal Applicant:	Davis, California University of
Amount Requested:	$547,937
Primary Investigator:	James A. Hobbs, University of California, Davis

FRP primary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	**The primary purpose stated in the Project Purpose section was "to develop a better understanding of the range of suitable environmental conditions for longfin smelt reproduction, development and growth under laboratory conditions." Although clearly stated, that purpose is not captivating. Moreover, goals and objectives were not clearly stated, although the sentence starting "To accomplish these goals…" can be interpreted to mean that the primary purpose sentence also stated the goal, and the tasks stated later in the sentence can be interpreted as the objectives. A primary objective was stated later in the Approach & Scope of Work section, but it would have been more informative if it had appeared in the Project Purpose section. By the way, the hypotheses stated in the Approach & Scope of Work section were stated as questions that are not testable hypotheses. All this indicates that the proposed research is less groundbreaking science and more standardized data generation. That is not necessarily bad, but it requires a strong justification when requesting this much funding.**
Background/Conceptual Models	**I liked the first paragraph of the Background and Conceptual Model section, because it provides neophyte readers with a brief idea of the complexity of the stressors potentially affecting fish in the Bay-Delta system. However, the Conceptual Model portion of this section did not provide a good conceptualization of how all the potential stressors might impinge upon longfin smelt populations.**
Approach	**The approach is pretty straightforward and does not appear to involve much innovation. Fairly standard**

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Proposal Applicant:	Davis, California University of
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Primary Investigator:	James A. Hobbs, University of California, Davis

FRP secondary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	**The purpose of this proposal is to develop culture techniques for longfin smelt including evaluation of the effects of temperature and salinity on various life history parameters. In addition, attempts will be made to validate stable isotope approaches to identify historic habitat use and vital rates for population modeling will be estimated.** **and temperatures on egg and larval growth and survival (2) validate the use of otolith oxygen isotope ratios 18O/16O to reflect environmental history, (3) validate the use of histopathology biomarkers and nutritional status to determine the condition of longfin smelt exposed to different salinities, temperatures and water quality and. (4) Determine vital rates of longfin smelt relevant for effective modeling of longfin smelt population dynamics, such as development rates, growth rates, feeding rates, and fecundity.**
Background/Conceptual Models	**The background information is thorough although the conceptual model figure was confusing.**
Approach	**Detail is lacking for most aspects of the proposed research including whether or not sufficient samples can be obtained and maintained in the lab. Sample sizes for experiments generally are not described, nor are data management or statistical analyses. There appear to be few hypotheses presented for the proposed researchIn addition, the pathology and culture sections are not well integrated.**
Feasibility	**There are serious questions as to the feasibility of this project given the lack of detail in several portions of the proposal including a demonstration that sufficient fish will be obtainable for experiments.**

– Inadequate

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

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

– Superior
X Good
– Fair
– Poor

Comments:
Both technical reviews were very good in their examination of important details of the project. While both referees found significant problems with the project (one related to rearing problems an done related to the validity of some otolith research), both suggested that there was considerable benefit to be derived from the research.

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

	to be examined. **The section heading says that it intends to relay hypotheses for the research. This is always a good thing since they must usually be justified by reference to previous studies to support the notion presented. Unfortunately, the authors give a list of four fairly generic questions about smelt reproduction and present no hypotheses. In essence, their questions can be consolidated into, "So, what drives smelt spawning and success?" No hypothesis is ever presented. Thus, it is not surprising that the proposers suggest that this is a proposal that is an add-on to existing research; almost an afterthought that might answer some extra questions.**
Approach	**This section is quite choppy and its format suggests that it was written by several hands without an effort to tie sections together. There are a number of logic leaps between paragraphs that make the approach difficult to follow.**
Feasibility	**There is little doubt that the personnel and equipment available can support the research and the straighforward nature of the research are quite feasible. There is a photograph of laboratory rearing set-ups. Although not mentioned in the body of the proposal, I assume that these are the working facilities for th research. This lack of reference to the photograph makes one wonder how careful the proposers might be to completing the rest of the proejct.**
Relevance	**This project would be very relevant to the Native Fish Biology and Ecology objective.**
Qualifications	**The proposers are all well established scientists with excellent track records of research funding and successful project completion.**
Summary Comments	**Perhaps it is because I am unfamiliar with some of the techniques described, but this proposal was difficult to follow in many places and the conceptual model that did not include the role of the drivers being tested left me wondering if there were any real questions to be tested. This was underscored by the lack of any hypotheses in the statement of the approach. The add-on nature of this project to existing work makes me wonder if some of these questions will, indeed, be the primary focus of this project.**

Please identify your overall ranking for this proposal:

– Superior
– Above Average
x Sufficient

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Proposal Applicant:	Davis, California University of
Amount Requested:	$547,937
Primary Investigator:	James A. Hobbs, University of California, Davis

FRP secondary Reviewer's Evaluation Summary and Rating

Provide a brief explanation of your summary and rating.

Comments:

Purpose	**The executive summary of this proposal summarizes the work much better than the body of the proposal. The idea of determining the effects of changes in salinity and temperatuer on longfin smelt spawning, growth and survival are critical to the long-term management goals to support the success of this endangered species. The choppy nature of the proposal, itself, makes it difficult to determine if the research is appropriate. For example, the purpose statement has several sections that are obviously descriptions of approach. Interestingly, the approaches in the purpose section don't necessarily coincide with those in the approach section.**
Background/Conceptual Models	**The background literature review does a very good job in detailing the state of the art of the knowledge of longfin smelt in the Delta area and what research has been accomplished to this date. However, there is no review of longfin smelt biology outside of the Delta. Since I am not a smelt biologist, I would have preferred a little more comprehensive review of other studies, especially some generic information on the purported impacts of salinity and temperature on closely related species, if none has been done on the longfin smelt.** **The conceptual model of longfin smelt reproductive cycles is informative but does not encourage me to suppose that the proposers have any idea of the drivers of the success of smelt populations nor, especially, the roles of temperature and salinity, since they don't appear to be incorporated into the conceptual model. So, I still don't know if these are appropriate drivers**

	fish would not be granted.
Relevance	**Because so little is known about longfin smelt, the proposed research is highly relevant to informing other scientists, modelers, and managers.**
Qualifications	**The researchers appear to be qualified to perform the proposed research.**
Summary Comments	**This proposal was not strongly written, and full attention to details did not appear to have been given when assembling and proofing it. Additionally, I don't believe the project was well-conceived, because the potential bottleneck of not being able to rear enough (or any) longfin smelt in the laboratory could be fatal to the other components of this study. Perhaps it would have been more effective to propose an initial, smaller study of culturing methods. Then success in that project could have been followed by a proposal to test the effects of various environmental parameters on survival, growth, reproduction, and other sublethal endpoints, incorporating a few more disciplines to help construct a more comprehensive story about longfin smelt.**

Please identify your overall ranking for this proposal:

– Superior
– Above Average
– Sufficient
X Inadequate

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

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

X Superior
– Good
– Fair
– Poor

Comments:
The external reviewers provided thorough and thoughtful reviews. Although they identified many problems with the proposal, I thought the reviewers' comments were quite restrained in the face of the egregious errors in some places of this less-than-carefully written proposal.

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

methods will be used to conduct the fairly standard experiments, except for culturing of the fish in the lab – where standard methods do not appear to be available. Because rearing longifn smelt for the experiments will be a major bottleneck, I was left wondering at the lack of discussion of alternatives, if the fish brought in from the field do not survive and/or spawn.

Although the research team was touted as being multidisciplinary, a wide variety of disciplines did not appear to be represented on the team, and coordination among the team members was not apparent. That seems to be a missed opportunity.

A rationale for choices of exposure conditions in the laboratory experiments did not appear to be presented. Additionally, a strong justification for the utility of the standard body condition index (gross histopathology) measurements was not presented; instead, that method just appears to be something that is in the researchers' toolbox and might be worthwhile using. Contrary to the claim in the proposal, those gross histopathology indices are not highly sensitive indicators of stress. Therefore, although it would be nice to know "baseline" levels of those indices for a lab population, the utility to managers looking for subtle trends in the field might be limited. The biochemical biomarkers that will be investigated (e.g., choriogenin, vitellogenin, glycogen) might be slightly more sensitive, but a strong rationale was not presented for using those biomarkers as sopposed to the multitude of other biochemical biomarkers that are available.

Feasibility

It is not clear from the information provided that adult or young longfin smelt can yet be cultured well in the laboratory. Because all the other experimental work depends on fish surviving the initial culturing periods, failure of this portion of the research could be fatal to the rest of the research components. All those other research components appear to be feasible, provided surviving fish are available to begin those experiments. In this study, discussion of contingencies is very important to evaluation of feasibility.

Additionally, no details were provided about collection of longfin smelt from the field. Because of the tenuous status of their populations, I expected to see detailed information about collection locations, procedures, and permissions from appropriate agencies. That in itself could be a fatal hurdle, if sufficient numbers of fish could not be collected or permission to collect the

Relevance	**The proposal meets PSP relevance standards.**
Qualifications	**The PI's are qualified to undertake this work.**
Summary Comments	**There are some good ideas in this proposal and longfin smelt are in trouble. However, the PI's need to demonstrate that they can capture and hold smelt prior to funding of a large multifaceted project like this. Perhaps a pilot study should be funded in which the PI's can demonstrate that they can hold fish, facilitate successful reproduction and raise young. The proposal was poorly prepared with format changes throughout and poor editing (missing citations, etc.). It read like the PI's just stapled their separate sections together.**

Please identify your overall ranking for this proposal:

– Superior
– Above Average
– Sufficient
X Inadequate

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

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

– Superior
X Good
– Fair
– Poor

Comments:
Both reviewers were thorough and had insightful comments on the proposed research. As seen in reviews of other proposals, both reviewers found critical problems but one was forgiving while the other was not. I did find Reviewer 1's final rating of above average a bit puzzling, given that she/he rated both the approach and feasibility as only "sufficient", which clearly is not a fundable rating.

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

Proposal Title: Basic biology of the longfin smelt: Effects of Salinity and Temperature on Longfin Smelt Spawning, Growth and Survival in a Laboratory Culture.

Proposal Number: 0127

Proposal Applicant: Davis, California University of

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

Project

comments	The goals and objectives of the study are clearly stated; the hypotheses are not as well stated. The proposed study is timely and important, and will likely add to the base of knowledge on longfin smelt. It will likely result in the development of optimal rearing conditions for longfin smelt, and information on biomarkers of temperature and salinity stress which has ecological implications to larval survival in brackish areas in relation to variability in volume of river outflow. It may also validate the use of oxygen isotope ratio proxies for determining temperature history of smelt. At present information is lacking on the optimal conditions for broodstock maintenance, spawning and rearing of larval stages of longfin smelt.
rating	Above Average

Background

comments	A conceptual model was clearly stated in the proposal. However, the following are some of the weaknesses noted in the proposal. 1. There was no reference in the proposal to studies (e.g. Dryfoos 1965; Moulton 1970) that have attempted to spawn and document developmental rates of longfin smelt in other areas. 2. There was no reference to temperature range at which longfin smelt spawn in the wild (based on trawl data) to justify selection of temperature range (12, 15, 18oC for larvae) for physiological tolerance experiments 3. No reference to the specific salinity range at which gravid adults, eggs, larval and post-larval smelt have been collected in the wild to justify salinity range (0, 2, 4ppt for larvae and eggs; 3-6ppt for varying salinity experiment, and 2 to 10ppt for salinity challenge or transfer experiments) selected for lab experiments 4. Many typographical errors are present in the proposal 5. Health status of the fish will be examined for fish held in the lab under various conditions, particularly to evaluate the effects of salinity, temperature, nutritional status and captivity-related stress on smelt reproduction. Since water quality conditions were mentioned as a possible contribution to the decline in longfin smelt abundance in the system, it would have been useful also to propose to examine the health status of fish caught in the wild from various areas for comparisons with

	to pick. On page 7 the food habits of the longfin smelt in the wild are mentioned. That deserves a reference. In vitro on the same page should be italicized (which I can't seem to do here, either). At the bottom of the same page mention of transfer to several salinities is made, but I didn't see anything about that in the overall research plan. How many replicates will be used (first line on page 8)? Three replicates are mentioned under (2). Under year 2 experiments and beyond (p. 8), will a modified proposal be submitted? Under task 2, "longfin smelt" suddenly becomes LFS (without being defined), showing again that no one carefully proofed the final submission, or at least didn't do it well.
rating	Inadequate

Feasibility

comments	The approach is certainly well documented and technically feasible. The most vulnerable part of the research is the culture system. If the smelt can't be maintained alive for fairly long periods (sufficiently long to spawn) or if the larvae can't be kept alive, the entire project will collapse for lack of experimental animals. That's a risk with any culture project with a 'new' species. That may be the basis upon which to fund a more modest proposal to look at feasibility of captive spawning and larval rearing for a year with the option of conducting other aspects of the proposed research once feasibility was demonstrated. If the fish can be produced as envisioned, the other components of the project should be well within the grasp of the authors.
rating	Sufficient

Relevance To The Delta Science Program

comments	The section that addresses the PSP priority research areas indicates that the proposed work is related to at least two. The researchers clearly will be multidisciplinary in terms of being different breeds of biologists. The amount of collaboration among them is questionable, since the don't seem to have collaborated sufficiently in terms of meshing the work plans.
rating	Sufficient

Qualifications

comments	The qualifications of the scientists on this proposal indicate that they can effectively complete their tasks. The culture system appears to be adequate for the job and the backup laboratory support at UC Davis is mentioned several times.
rating	Above Average

	response to the experimental variables can be seen in longfin smelt as opposed to delta smelt.
rating	Sufficient

Background

comments	The "Background and Conceptual Model" section (why are there two sections - pp. 3 and 4 that have "Conceptual Model in their headings?) is basically the literature review part of this proposal. The actual conceptual model is in the second section with that heading on pp. 4 and 5. The life cycle is depicted in Figure 2 which I found difficult to follow. The circles on the right side of the figure don't join but just go round and round. I should mention that Figure 3 (the one with the photographs) is not referred to, though the facilities are described. The mention of Figure 3 in the text relates to the figure with the graphs. This underscores the notion that nobody did a thorough edit of the finalized proposal to ensure that such problems were caught and dealt with before submission. "X2" is mentioned several times and one of the PIs has a project underway with X2 in the title. I don't see where X2 is explained anywhere. In looking up the term on the Internet, I find it could relate to a number of things, most of which don't seem relevant to the research. In any case, some explanation would have been helpful.
rating	Sufficient

Approach

comments	Since the objectives are not clearly presented as "To" statements, one has to pull them out of the text. Again, the approach seems to be a bit of a hobo stew of elements, though each element will probably have some utility to overall understanding of longfin smelt biology. The page headed "Task and Budget Summary" clearly shows which of the three scientists will be doing and managing what, but, unless there are some budget details missing from the copy that I was able to download, there it no way to adequately determine how much of the budget would go to salary support, overhead, travel, supplies, equipment, etc. With a half million dollar project, much more budget detail should have been provided. The plan for dissemination of the proposal would largely be presentations at a Delta Science Conference and annual reports. I am making the assumption that peer reviewed publications would also be produced. As for widespread dissemination, it's not clear that will be one of the outcomes. I didn't see anything about contributions to larger data management systems, but if one exists that could benefit from the data produced, that should have been addressed. My assessment is based on the inadequate budget detail and justifications. If those exist and I just wasn't provided with them, I would rate it as "Sufficient." A couple of nits I'd like

Proposal Title: Basic biology of the longfin smelt: Effects of Salinity and Temperature on Longfin Smelt Spawning, Growth and Survival in a Laboratory Culture.

Proposal Number: 0127

Proposal Applicant: Davis, California University of

Project

comments	The goals are buried in the text, but seem to be reasonable. There is a section called "Objectives and Hypotheses," but it only poses a short series of questions to be addressed. There are no objectives statements as such (e.g., no sentences indicating "The purpose of this study is to...." Also, there are no hypotheses presented. The proposal puts an interdisciplinary group together, each of whom appears to have written their own section and didn't coordinate well at all. The various experiments aren't tied together very well – each person has his/her discipline and pursues their specific interests, which in some cases give the impression, at least, that round pegs are being forced into square holes. Some sections have incomplete sentences, the formatting changes from section to section (task 4 doesn't have a heading and the bullet statements on p. 11 have incomplete sentences and the first two don't look like deliverables – at least the way they're written. The studies for the most part seem justified, though one could question why use of otoliths are a proxy to determine growth rates, when those will be measured directly from cultured animals? That could be justified as adding additional data that might be compared with fish collected in the field for a growth comparison with cultured fish and by saying, "since we're collecting otoliths for isotope ratios, why not look at growth at the same time?" The study would build (in part) on information collected from a related species, which could be important. If the longfin smelt is a threatened species, obtaining the information outlined in the proposal should be useful in future recovery attempts. As an aside, can collecting permits be obtained for capturing this threatened species from nature? I see the investigators plan to work with agencies, which may be important in terms of collecting permits. This would be a research project that would address some important issues with respect to habitat requirements/tolerance of various stages in the life cycle of the fish. There is always the problem of whether the performance and physiology of fish in captivity adequately mirror those in nature, but for controlled experiments of the type proposed it's often necessary to conduct them in the lab and extrapolate. I'd like to have seen the selection of temperatures and salinities justified more completely (why only three levels? Why not use various combinations of temperatures and salinities?). I'm not convinced that 'novel' information, methodology or approaches will be developed as most of the techniques have been used on related species, but it may be important to determine what differences in

Relevance To The Delta Science Program

comments	The proposal addresses the "Native Fish Biology and Ecology" priority research topic identified in the PSP. The project also has relevance to the topic area: Food webs of key Delta species and their relationship to water quality and other drivers. The proposed work is collaborative and interdisciplinary including expertise in ecotoxicology, aquaculture, and otolith microchemistry. Results will likely be useful to the Delta resource managers and policy makers.
rating	Above Average

Qualifications

comments	The project investigators appear to be well qualified to conduct the proposed research and have experience working on Delta smelt, a related species. They also have authored publications that are relevant to the proposed work. Research infrastructure is also available to do the work.
rating	Above Average

Overall Evaluation Summary Rating

comments	Longfin smelt is an ecologically important species, but little is currently known about optimal conditions for culturing the species. Likewise, there is no available information on the biochemical and physiological responses of the species to temperature and salinity, and bioenergetic parameters have not been determined for the species. The proposed project will help fill these gaps in our knowledge of longfin smelt. However, the PIs of the proposal should have made reference to studies that have attempted to spawn and document developmental rates of longfin smelt in other areas (e.g. Dryfoos 1965; Moulton 1970). In some sections, the proposal could have been presented more clearly. From my experience longfin smelt caught during the spawning run do not feed and rarely survive for a long time, especially after spawning. So, it is unlikely that maintaining 2yr old smelt for a long time in the lab will be successful. Attempting to use 1 year old smelt for broodstock maintenance may be more successful that using 2 year old smelt.
rating	Above Average

	the lab. study, and to evaluate the effects of environmental factors (e.g. pesticide, water quality, food availability)
rating	Above Average

Approach

comments	Generally, the approach is well designed and appropriate for meeting the objectives of the project. It is clear who will carry out the performance management tasks and administration of the project. The proposed work will likely yield valuable results. Perhaps, the most important likely results are: determination of optimal conditions for broodstock maintenance, spawning and rearing of larval stages of longfin smelt. The second potentially important result is the determination of the physiological responses of early life stages of smelt to temperature and salinity. This may provide insights that will help explain the observed positive relationship between longfin smelt abundance and freshwater outflow. However, it appears that the investigators already have funding to conduct this aspect of the study: "How will longfin smelt respond to Fall X2 manipulations? Experimentally determining early life-stage sensitivity to salinity". There are plans to disseminate results of the study through presentations at professional meetings, production of a manual of culture techniques of smelt, and publication of manuscripts.
rating	Sufficient

Feasibility

comments	The study approach was documented in the proposal. Some aspects seem not to be technically feasible. For example: 1. Fish (1 yr old and 2 yr old) will be collected a couple of months prior to spawning and in spawning condition. From my experience longfin smelt caught during the spawning run do not feed and rarely survive for a long time, especially after spawning. So, it is unlikely that maintaining 2yr old for a long time in the proposed study will be successful. Are the fish going to be collected when they are still in brackish water on in freshwater where they spawn? 2. If smelt are brought into the lab in spawning condition, are they going to be induced to spawn or allowed to spawn naturally? Previous attempts to document the development rates of smelt were based on natural spawning in the lab which is easy, if kept in the right conditions. 3. Growth back-calculation models developed by Hobbs et al. (2007), which are for delta smelt, will be used to estimate daily growth for YOY longfin smelt. Has daily growth increment been validated for longfin smelt? I have not seen any reference on that.
rating	Sufficient

Overall Evaluation Summary Rating

comments	When I review proposals, I look for how much authors pay attention to details as I believe that provides some insight how much thought and time has gone into preparation of the submission, and possibly provides some insight as to how the actual research will be conducted, though that's speculative. In the case of this proposal, I found a lot of problems with literature citations, which is another indication that the final product was not carefully reviewed. I think it might be useful to the authors if I point out some of the problems I detected. p. 1 - Baxter et al. 2008 is cited - In the citations there are 2008a and 2008b. Do they mean both or one of those two? p. 3 - Bennett and Moyle 1995 in the text is 1996 in the literature cited. Feyrer et al 2008 doesn't appear in the Literature Cited. p. 5 - RMP 2008 is 2009 in Lit. Cited p. 7 - Bridges et al. 2003 and 2005 do not appear in the literature cited. p. 8 - Teh 1997 is not in the Lit. Cit. p. 10. Hobbs et al 2007 is 2007a and 2007b in the Lit. Cit. Which is it, or is it both? Campana and Neilson 1985 is not in the Lit. Cit. Kerr et al. 2008 is not in Lit. Cit. p. 11. At the bottom of the page the citation for May et al. 2008 is a complete citation and not bold, so it doesn't follow the same pattern as the others. It also appears in the literature cited section, so why isn't it the same as the rest of the citations in the text? p. 13. First sentence of the Lindberg section isn't a complete sentence. Second sentence doesn't make sense. Why are references included (second paragraph) when they all appear in the Lindberg vita? Literature Cited Section Adams and 6 co-authors (p. 15) doesn't follow the style used in the other citations. AOAC doesn't appear in the text Barnett-Johnson et al. are not cited but can only be found in the Lindberg vita. Feyrer et al. 2007a is not cited in text Feyrer et al. 2007c not cited in text Hobbs et al. no date (in final report to CALFED of 2009) not cited in text Lindberg et al 2003 not cited in text Lindberg et al 2000 and 1997 not cited in text (also out of order 1997 should precede 2000) Teh et al. 2003 not cited in text
rating	Sufficient