Proposal Reviews

#78: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

H. T. Harvey & Associates, U.C. Davis

Research and Restoration Technical Panel Review	
Bay Regional Review	
Delta Regional Review	
External Scientific Review	#1 #2 #3
Environmental Compliance	
Budget	

Research and Restoration Technical Panel Review:

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

Proposal Number: 78

Applicant Organization: H. T. Harvey & Associates, U.C. Davis

Proposal Title: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

Review:

Please provide an overall evaluation summary rating:

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

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Superior	**This is a risky approach (introducing a noxious weed into field sites) that will not yield a mechanistic understanding of factors limiting growth of established Lepidium.**
-Above average	
-Adequate	
XNot 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?

   The goal of the research is to examine how salinity and inundation influence the distribution of a noxious weed, Lepidium latifolium. These are very timely questions, however, this study cannot distinguish between the 2 main factors they propose are controlling distribution. The lack of a specific model describing a process for how L. latifolium stress tolerance might influence invasion into marshes makes it difficult to evaluate whether the results generated by the proposal will be pertinent or useful. The authors do not present a clear conceptual model to support why they believe studying the limited response of adult plants in the absence of competition is will lead to practical models.

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?

The proposed study has several conceptual flaws that severely limit the validity and applicability of the information it will generate. There is considerable doubt regarding the ability of the methods to produce unambiguous and ultimately useful results. The proposal is not likely to produce a working understanding of how or why patterns of salinity and inundation relate to patterns of L. latifolium establishment.

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?

   No

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

   Yes

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?

   This proposal was ranked Low by the Bay review panel. Expansion of existing clones is not a critical issue in the long term invasion by this species establishment of seedlings is the key life history stage. Increasing salinity in tidal marshes as a control method is not feasible so the proposal is regionally irrelevant.

   It was also ranked Low by Delta regional review due to its focus on tidal marshes of the Bay.

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?

   Concerns were minor.

Miscellaneous comments:

None

Bay Regional Review:

Proposal Number: 78

Applicant Organization: H. T. Harvey & Associates, U.C. Davis

Proposal Title: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

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

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

The deficiencies of the proposal are its lack of attention to mortality and growth inhibition of pepperweed seedlings, and the technical limitation of growing container-confined sods of clonal plants in California tidal marshes that lack summer rainfall. The effect of whole-clone size on ramet growth responses to salinity is not adequately addressed.

1. Is the project feasible based on local constraints?

   -Yes **X**No

   How?

   The life-history stage which is relevant to establishment of new invading colonies of perennial pepperweed is the seedling stage. Expansion of existing clones, and growth of existing clones in brackish marshes, is not a critical issue in the long-term invasion history of this species because of recurrent salinity reductions in years of high rainfall. Therefore, the focus of the proposal on growth responses of transplanted clones (sods) is not by itself a feasible or appropriate method for assessing the role of salinity in the species invasion. Dieback and inhibition of clones during high salinity years is rapidly reversed in wet years. In the study area proposed, marsh salinities are permanently (and variably) depressed by urban wastewater discharges.

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

   -Yes **X**No

   How?

   Mortality of established clones by salinity (if any) in San Francisco Bay, where salt marshes may become hypersaline in drought years, is unlikely to be relevant to the North Bay pepperweed invasion, the focus of CALFED interest.

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

   -Yes **X**No

How?

The methodological focus on transplanted clones (sods) appears to reflect the experience and methodological preferences of the applicant, rather than the urgently needed practical information on feasible control methods identified by regional wetland managers. Increasing substrate salinity above natural levels is not a feasible or appropriate control method outside South San Francisco Bay, so the proposal is regionally irrelevant.

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

-Yes **X**No

How?

The SF Bay National Wildlife Refuge is the principal wetland manager in the South Bay, but the methods addressed by the proposal do not have identifiable applicability to control of existing stands of pepperweed in the refuge.

Other Comments:

Delta Regional Review:

Proposal Number: 78

Proposal Title: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

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

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

targetted at the bay region

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   still need to obtain access permits, however

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

   XYes **-**No

   How?

   invasive species control/research (MR-1 + DR-5))

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

   XYes **-**No

   How?

   other efforts in the bay

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

   XYes **-**No

   How?

   coordinating with Cargill and FWS

Other Comments:

data will be beneficial but should be coordinated with other Lepidium research proposed (University of California, Davis "Invasion dynamics of perennial pepperweed, Lepidium latifolium, and their consequences for protection of natural and restored wetlands in the San Francisco Estuary") as well.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **78**

Applicant Organization: **H. T. Harvey & Associates, U.C. Davis**

Proposal Title: **An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment**

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

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

none

Review:

Please provide an overall evaluation summary rating:

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

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**This is a risky approach (introducing a noxious weed into field sites) that will not yield a mechanistic understanding of their question.**
-Good	
XPoor	

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

   The goal of the research is to examine how salinity and inundation influence the distribution of a noxious weed, Lepidium latifolium. These are very timely questions, however, this study cannot distinguish between the 2 main factors they propose are controlling distribution.

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

This study is not justified based on the lack of adequate hypothesis testing, and the very real damage they may do to the target marshes by planting sods of the weed.

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 will NOT result in a mechanistic understanding of pepperweed invasion.

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?

   This is not a feasible approach.

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?

   Scant details are provided.

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?

   No products are listed.

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 PI has done 2 similar studies elsewhere.

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

   No.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **78**

Applicant Organization: **H. T. Harvey & Associates, U.C. Davis**

Proposal Title: **An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment**

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

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

I am employed as post doctoral researcher in the Department of Environmental Science and Policy, UC Davis.

Review:

Please provide an overall evaluation summary rating:

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

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Excellent	**Understanding how salinity and inundation patterns influence the establishment of L. latifolium is an important component to developing management and control strategies for this invasive plant. Even though this question is only one part of a broader array of factors that probably influence L. latifolium invasion dynamics, it still potentially involves a complex interaction between a number of elements. For example, different L. latifolium life stages may respond in unique ways to salinity and inundation or salinity and inundation may interact with competition to influence establishment. The authors do not present a clear conceptual model to support why they believe studying the limited response of adult plants in the absence of competition is preeminent among these elements or how it will lead to practical models.** **In addition to this, the methodology proposed by the authors will not produce un-ambiguous tests of their hypotheses. Because of this the proposed project is unlikely to produce clear results that could be applied to the development of a management scheme.**
-Good	
XPoor	

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

   The goal of the proposed project is clearly stated: to determine how soil salinity, depth and duration of inundation "control the distribution of [Lepidium] latifolium in the Bay-Delta region" [P. 1]. The authors state that this information will be useful in designing restoration projects that promote natives over L. latifolium and in designing control strategies that focus on areas likely to be susceptible to L. latifolium colonization.

   This information does indeed have a clear and practical use in helping to develop general risk assessments for the spread of L. latifolium and in designing specific control strategies to prevent its establishment in newly restored wetlands.

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 state that a number of distinct factors have been found to influence vegetation patterns in salt marshes. In addition to soil salinity and patterns of inundation, the authors mention accumulation of phytotoxins, soil nutrients, and soil organic content. Other factors, not cited by the authors include disturbance patterns and competitive interactions. Despite the complexity of factors that could determine the pattern of L. latifolium establishment in the Bay-Delta region the authors have chosen to only examine two: soil salinity and submergence. These factors may indeed be the most salient, but little justification (either for salt marshes in general or L. latifolium in particular) for concentrating on these two factors to the exclusion of the others is provided.

   The authors provide only a sketchy conceptual model for how salinity and inundation might influence the pattern of L. latifolium colonization. Admittedly, this is partly a consequence of the scant amount of information that is available concerning L. latifolium in estuarine habitats and not a direct criticism of the proposal. However, the lack of a specific model describing a process for how L. latifolium stress tolerance might influence invasion into marshes makes it difficult to evaluate whether the results generated by the proposal will be pertinent or useful. For example, the authors state, both as a general goal (P. 4) and as specific hypotheses (P.5), that they want to understand how the stress tolerance of L. latifolium relates to its distribution in marshes and its ability to colonize marshes. Does stress tolerance play a more important role at the early establishment stage (seedling germination, early growth), at latter life stages in its effect on vegetative growth and the production of reproductive rhizomes, or at other reproductive stages in its effect on flowering and seed set? The proposed study only will measure one of these life stages (vegetative growth). The authors provide no justification for why this stage is any more significant for colonization success or for the observed zonation of L. latifolium in marshes than the other stages. It is possible that given its large root systems, L. latifolium has an ability to perform well vegetatively across a wide stress gradient, but seed germination and seedset may be more sensitive to variation in salinity and inundation.

   Finally, although the authors hope to understand how the distribution of L. latifolium within wetlands is shaped by its stress tolerance the authors provide only scant descriptions of what the pattern of L. latifolium distribution relative to environmental factors is, nor do they plan to measure this pattern in the field.

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 study has several conceptual flaws that severely limit the validity and applicability of the information it will generate:

A) As I discuss above in section two, the authors propose to only measure the response of adult, established plants to differences in salinity and inundation regime. The response of the adult plants could be very different from that of juveniles or germinating seeds. The interaction of these early life history stages with environmental conditions may in fact be the most important determinant of the distribution of adult L. latifolium in the marsh.

B) Related to this, the authors do not propose to measure the flowering or seed output of transplants. However, the influence of salinity and inundation on seed production may affect the pattern of L. latifolium spread greater than does their influence on the vegetative growth of adult plants. This information is very pertinent to control and management plans. For example, it might be useful for control efforts to focus on eradicating L. latifolium in areas that are predicted to have high seed output (as opposed to areas where seed was less likely to be produced).

C) The manner in which the authors propose to manipulate inundation will make it difficult to determine the cause of any responses they see. The authors propose to simulate areas of marsh that experience different levels of inundation by placing marsh sods at three elevations: "ambient, 26 cm above ambient, and 26 cm below ambient". It is unclear if these manipulations meaningfully relate to the actual differences in inundation patterns found in a real marsh. For instance, a sod of potted marsh vegetation sitting 26 cm above the surface of a marsh is probably different in a number of pertinent characteristics than a section of intact marsh that receives less inundation by being 26 cm higher than other areas of a marsh. The sod will probably be exposed to greater amounts of wind, have different hydrological properties, or develop greater soil salinities than the similar area of intact marsh. The extent of these differences is probably related to the size of the sod, although the size of experimental sods is not precisely specified by the authors. Are any responses seen in the treatments caused by differences in inundation or by differences caused by the experimental manipulation? The control treatment the authors propose is not sufficient to elucidate how the act of creating a potted sod will affect the response of the treatment plants; the control treatment will only be established at the "ambient" elevation of the donor marsh. This does not answer the question of whether potted sods placed 26 cm above the "ambient" level of a marsh behave differently from sections of intact marsh that experience the same inundation pattern as the experimental treatment.

This point is related to another confounding factor which is that the level of inundation a section of marsh experiences is poorly defined. What is the "ambient" level of a marsh? Is it the mean elevation level? The mean inundation level? The authors state that the experiment will be blocked with respect to distance from the edge of slough channels. However, do the three marshes which correspond to the salinity treatment also differ in their elevation and consequently their patterns of inundation? In other words, is a low inundation treatment (26 cm above ambient) in the high salinity marsh the same in terms of level of inundation as a low inundation treatment in a comparable block in the high salinity marsh?

D) Similar to the method of manipulating inundation, the proposed method of manipulating salinity produces a number of confounding factors that severely clouds the interpretation of any results produced. Removing sods growing at one salinity and placing them immediately into

another salinity presumably creates a large immediate osmotic shock, distinct from any long term influence of salinity. It will be impossible to tell if any responses are simply caused by this immediate shock. Also, the authors do not describe the salinity conditions of the donor marsh. The salinity the experimental sods experienced in their native marsh could influence their response. For example, if the donor marsh is high salinity the sods placed in the low salinity marsh might show a unique response from the sods placed in the high salinity marsh that would be caused by the relative difference in salinity between donor and treatment marsh, not the innate effect of salinity on L. latifolium growth.

In addition, it is possible (in fact likely) that the three marshes differ in a number of factors besides their salinity such as soil nutrient status, organic matter, or tidal flow patterns. For example, do the marshes differ in their salinity in the first place because of physical factors such as soil hydrological properties? These differences could confound interpretation of any results.

E) The pots that each sod will be placed in could influence the results. Since L. latifolium has a large and potentially deep root system, potted sods may have a very different response to changes in salinity and inundation than freely growing plants. As outlined above, the lack of suitable controls makes it impossible to distinguish the influence of salinity and inundation themselves from their influence as moderated by the presence of the pot.

F) The authors purposely plan to limit the influence of competition from other marsh vegetation on the experimental sods by clipping the surrounding vegetation. This is an important aspect because it will allow the authors to examine the influence of inundation and salinity de-coupled from competitive interactions. As the authors admit, clipping will not completely remove the influence of competition, although they hope that it will minimize it. The authors do not specify how large of a competition buffer zone they plan to provide for each treatment. If the clipping zone is small, surrounding vegetation may still significantly influence the local conditions of the experimental sods, by changing subsurface water flow regimes for instance. In any event, clipping alone might not be sufficient to remove any latent effect of competition. Lepidium latifolium along with most other marsh species are long lived perennials with large root systems. Their influence on soil conditions could linger for long periods even if above ground vegetation is removed. This concern would be lessened if it could be shown that the three marshes do not generally differ in the level or character of competition (i.e. cover and species composition). However, the authors allude to but do not supply detailed information about the vegetation similarities of each marsh.

Related to this, it would still be very interesting to know how competition interacts with salinity and inundation to influence the establishment success of L. latifolium. In order to successfully colonize a marsh, after all, L. latifolium, experiences salinity and inundation differences in the presence of competition from other plants. The results of the proposed study will not provide this information.

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 methodology outlined in the proposal is technically feasible given the schedule of the proposed work. Although the specific methodology is supported by previous published work by the authors, there are considerable questions about its ability to produce unambiguous and ultimately useful results (see section 3 above).

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?

   Within the context of the proposed methodology there are logical performance measures and appropriate quantification. However, as I outline in section 3 the proposed methodology has inherent flaws which will make it difficult to evaluate how the criteria measured by the authors inform their specific hypotheses.

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 I outline in detail above, because of the experimental design flaws of the proposed study few useful products will be generated. The proposal is not likely to produce a working understanding of how or why patterns of salinity and inundation relate to patterns of L. latifolium establishment.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   I do not have any knowledge of the track record of the authors with respect to previous projects.

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

   The budget is reasonable and adequate for the proposed work.

Miscellaneous comments:

The planting of L. latifolium into native marshes (albeit in pots) raises concerns about the unintentional spread of this invasive weed. The authors do not describe the level of L. latifolium infestation at the proposed introduction sites, but if the sites are currently pristine there would be a concern about inadvertently infesting them.

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **78**

Applicant Organization: **H. T. Harvey & Associates, U.C. Davis**

Proposal Title: **An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment**

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

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

None

Review:

Please provide an overall evaluation summary rating:

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

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Clean, clear proposal that could result in an exemplary study of non-native species limiting factors, which will be important to CALFED restoration relative to pepperweed but may also provide template for other native/non-native species issues.**
-Good	
-Poor	

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

   Goals and objectives are somewhat implicitly derived from the background information and statement of the problem, but hypotheses are explicit.

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

The proposal is well justified.

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 applicants well recognize the power of manipulative experiments to test hypotheses such as these, as compared to descriptive sampling. Given their design, the experiments should result in clear results and take into account confounding factors should as proximity to tidal channels.

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 approach is well documented and easy to evaluate for its feasibility. Likelihood of success is high.

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

   Performance measures are purely schedule/product based, rather than scientific (experiment) quality assurance/control and performance.

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 straightforward product will be a interpretive report.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Investigators and infrastructure appear to be highly qualified and familiar with the experimental protocols and constraints that you would expect with these field-based experiments.

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

   At $79,065, this has to be one of the more economical research projects proposed to CALFED, and certainly a bargain.

Miscellaneous comments:

Environmental Compliance:

Proposal Number: 78

Applicant Organization: H. T. Harvey & Associates, U.C. Davis

Proposal Title: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

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

   XYes **-**No

   If no, please explain:

   Will obtain a Special Use Permit from the US Fish and Wildlife Service's San Francisco Bay Wildlife Refuge.

   CEQA and NEPA will be complied with. On the Environmental Compliance Checklist, number 4, the applicant listed "Not Applicable" but they should put "yes" or "no" depending on whether they have completed and filed CEQA/NEPA documents.

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

   XYes **-**No

   If no, please explain:

   No budget or timeline for permitting and environmental documentation specifically listed.

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

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 78

Applicant Organization: H. T. Harvey & Associates, U.C. Davis

Proposal Title: An Investigation of the Flooding and Salt Tolerance of Lepidium latifolium L. (Perennial Pepperweed) in the Bay Delta Region and its Relation to Habitat Restoration: A Manipulative Field Experiment

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

   XYes **-**No

   If no, please explain:

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

   XYes **-**No

   If no, please explain:

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

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes **-**No

   If no, please explain:

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

   -Yes **X**No

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

   difference .40, was rounded off in the budget summary

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

If no, please explain:

7. Are there other budget issues that warrant consideration?

-Yes **X**No

If yes, please explain:

Other Comments:

information well defined in the budget summary/justification