

California Bay-Delta ERP Selection Panel Review

Proposal Number: 222DA

Applicant Organization: University of California Davis

Proposal Title: Cosumnes River Preserve Perennial Pepperweed Control Project

Recommendation: Fund With Conditions

Conditions recommended:

1. Targeted *Lepidium* control research. Objective 2 should include these additional features in the experimental design:
 - a. The herbicide Tryclopypyr, which should be registered for use by April 2004, should be evaluated along with Chlorsulfuron and Glyphosate.
 - b. The tarping trials should also include treatments of mowing and disking without tarping. Vegetation response should include both passive and active revegetation approaches.
 - c. The monitoring of soil chemistry should include N, P and K levels and related to the process of revegetation.
2. Adaptive management framework. The project's adaptive management framework should be revised to develop and test models related to spatial processes. They should include the effect of various factors (hydrology, soil, vegetation) on spread rate dynamics, and age/stage structure and demography as applied to internal patch structure and geometry. A stronger linkage between experimental treatment with a more comprehensive demographics analysis is warranted.

Provide a brief explanation of your rating: The Selection Panel felt that this is a solid proposal that is well described with a good approach and justification. However, the Panel agrees with the three technical reviewers (all giving the proposal a "good" rating) that there needs to be a more explicit link between experimental design and monitoring and adaptive management. These deficiencies can be addressed by revising the project in conformance with the conditions the panel recommends.

The Selection Panel hopes its comments are constructive, and believes revising the proposal as it recommends can result in an excellent project. The project proponents should work with ERP staff and a strong weed scientist to address these conditions for funding.

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CALFED Ecosystem Restoration Program External Review Form
2002 Proposal Solicitation Package

Proposal Title: COSUMNES RIVER PRESERVE PERENNIAL PEPPERWEED CONTROL PROJECT

Review:

1. **Goals.** Are the project's goals and objectives clearly stated and internally consistent? What ecosystem restoration benefits will it provide?

The project goals are well defined, clearly stated and are consistent with each separate objective. Resulting work will provide both on-the-ground control of *L. latifolium* as well as new information on responses to several alternative control approaches. The breadth of the goals is large, but appear to be reasonable and consistent with the overall framework of invasive species amelioration- one of CalFed's stated goals.

2. **Approach.** Is the approach well designed and appropriate for the project's objectives? Is it justified by prior site studies or other information documented in the proposal? If additional information is needed to adequately plan and design the project, does the proposal include adequate provisions for obtaining it during the project's design and environmental assessment? If not, what additional information should be gathered?

The approaches are well outlined and clearly will lead to the objectives stated. There is sufficient detail in the methods and protocols and overall experimental designs to indicate that the results will be interpretable and answer some key questions regarding control strategies for this species. However, I have the following suggestions:

a. Revegetation and restoration are not sufficiently addressed- in fact they are not included in any objective as far as I can tell. Monitoring (Obj. 1) is not sufficient to establish or understand conditions favoring or impairing restoration, even though it will assess the "control" component. The present approach appears to depend on stochastic events that will follow "control" operation. Although this is important, additional manipulations of controlled areas (e.g. planting) might reveal valuable information considering the large investment in Obj. 1 and 2. I would even suggest that more funding be provided to this project in order to incorporate specific revegetation approaches on an experimental basis. This also would provide more information to incorporate in the adaptive management objective and strengthen it.

b. Objective 1 needs a quality control/ quality assurance component to provide a

true “measure of performance”. Simply enumerating the area “monitored” does not assure that the quality of results (i.e. accuracy). I suspect (from their prior work) that these authors know this and will include adequate ground-truthing, but it is not explicitly explained.

c. Since stands of *L. latifolium* alter edaphic characteristics, I suggest that N, P, K be added to the other variables being analyzed in the soils. These variations may have significant impacts on revegetation success and ultimately conditions for restoration.

d. I suggest that the seed bank be assessed as part of the monitoring, at least in some of the treatment areas.

e. Triclopyr has been registered (US EPA) as “Renovate” for aquatic and riparian uses, and is currently under review by CalEPA-DPR, and will probably be registered in CA by April, 2004. I suggest that this be included in the herbicide testing for the following reasons: It is selective and needs further assessment for control of this target plant; it provides another site of action (i.e. different from the SU’s) and thus may be a useful alternative to prevent development of resistance, a notorious characteristic of the SU’s; and it has a short half-life (few weeks generally) and could be used over water if necessary.

f. Objective 3 appears to be a catch all for a variety of activities, all couched as “Adaptive Management”. For example, the discussion on Multiscale Analysis really belongs in Obj. 1 (Monitoring)- and includes some wording aimed at “QA/QC”. Likewise, the discussion on “transport” really should be part of “targeted research” (Obj. 2), and really needs to focus on pathways for reintroductions and new dispersal (see seed bank above). I suggest that the gist of this objective should be on evaluations of research trials, control efforts and readjustments for subsequent year work based upon those evaluations. These authors appear to have taken literally the summary components identified in the CalFed Workshop on AM in contrast to applying those that fit this project best at this time, and for this scale of work. For example, the Early Detection/ Rapid Response component would apply primarily to new outbreaks outside existing infestations (or those reintroductions occurring after control). Also, the components of EDRR are well outlined and already published in the recent FICMNEW document, and in the EDRR recommendations produced by the Fed. Invasive Species Council (see <http://www.invasivespecies.gov/new/whatsnew.shtml>) . I do not see any part of this proposal that cites this, nor that actually addresses how a rapid response model will be applied, even though these models are well known and could be easily adapted to this project. In short, this section is, I believe, too broad and really should focus on the process that will be used for evaluation and alteration (if needed) of the project during the funded period. I would rather see a schedule of activities/tasks that accomplish adaptive management for this

project, coupled with performance standards (some of which are listed).

3. **Feasibility.** Is the approach fully documented and technically feasible? Is the scale of the project consistent with its objectives? Does it reflect “best practices” for this type of project? If not, how should the project be revised to reflect “best practices”? Is it likely to attain the ecosystem restoration objectives it seeks?

This project is feasible. It should encompass focused revegetation components as part of the overall plan. The methods described will provide very useful information on control of *L. latifolium*. It does include pertinent approaches to control (herbicidal and combinations of cutting and herbicide), but the assessments should be bolstered to examine impacts on seed banks and other dispersal that may impair sustainable restoration.

4. **Capabilities.** What is the applicants’ track record in terms of past projects? Is the project team qualified to efficiently and effectively implement the project? Does the proposal describe how additional expertise and other support necessary to successfully accomplish the project will be obtained? If not, what additional expertise or support is needed?

The applicants have strong background and expertise in large-scale monitoring, modeling and general ecological theory, and some ecosystem level management. However, I do not see any one with strong experience in weed biology, weed science, vegetation management, control or eradication, or moderate experience in invasive species research and management. Ms. Becky Waegell appears to have the most on the ground actual experience in plant control, along with Mr. Rick Cooper. This project would greatly benefit by including a weed scientist with appropriate experience in riparian/perennial vegetation management. I believe the gaps I have identified would have been filled by such a person, and that this expertise would greatly enhance the quality of data gathering, analysis and interpretation. This is a strong and mostly well thought out proposal, but it needs seasoned expertise and input from the very “discipline” of the management target: invasive weeds.

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

I believe this project would have greatly enhanced benefit/cost ratio if (a) an additional scientist (weed science/plant physiology) were included; (b) an enhanced restoration/revegetation component were added (even if another \$100,000 for three years were added). I also strongly suggest that the applicants contact the California Dept. of Boating and Waterways aquatic weed control program managers since they have been engaged in Section 7 Consultations, specifically pertaining to the Delta and habitats of the elderberry long-horned beetle and giant garter snake Wording and conditions in their BO (Biological

Opinion) would probably be applicable with moderate changes- this could save the project considerable time and money. Consultations with USFWS can be extremely lengthy and anything that can shorten and streamline the process would be welcomed by all I'm sure.

Additional comments:

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	My rating is based upon the mostly very sound approaches and methods outlined in the proposal, the need for this work and the probability of success. It is not rated "excellent" because it would be a far better project if key scientific personnel input in plant biology/ weed science were included. If this project is funded I strongly urge the applicants to seek input from senior weed scientists before launching into the program.
Good X	
Poor	

CALFED Ecosystem Restoration Program External Review Form

Proposal Title: Consumnes River Preserve perennial pepperweed control project

Review:

1. **Goals.** Are the project's goals and objectives clearly stated and internally consistent? What ecosystem restoration benefits will it provide?

Project goals are important and are clearly stated. However, I doubt the results can be extended to other species, as the proposal hopes in objective 3—response of nonnative species is strongly dependent on the match between species characteristics and the environment, and no two species are similar enough to merit extrapolation from one to another, much less to “most perennial terrestrial invasive plants.”

2. **Approach.** Is the approach well designed and appropriate for the project's objectives? Is it justified by prior site studies or other information documented in the proposal? If additional information is needed to adequately plan and design the project, does the proposal include adequate provisions for obtaining it during the project's design and environmental assessment? If not, what additional information should be gathered?

The approach consists of a reasonable combination of well-accepted protocols, most of which have been implemented in this system or other systems. As such, there is every reason to expect success in the application of this approach.

3. **Feasibility.** Is the approach fully documented and technically feasible? Is the scale of the project consistent with its objectives? Does it reflect “best practices” for this type of project? If not, how should the project be revised to reflect “best practices”? Is it likely to attain the ecosystem restoration objectives it seeks?

The proposed approach is fully documented and technically feasible. This ambitious project employs a well-tested approach; as such, it reflects “best practices” for this type of project. In my opinion, the project has a very high probability of attaining its objectives.

4. **Capabilities.** What is the applicants' track record in terms of past projects? Is the project team qualified to efficiently and effectively implement the project? Does the proposal describe how additional expertise and other support necessary to successfully accomplish the project will be obtained? If not, what additional expertise or support is needed?

This group of applicants has good credentials and a favorable track record. M. Renz is conspicuously absent, given the strong reliance on his/her work (e.g., conceptual

models for pepperweed control). I believe their choice of journals for publications is too modest—they should aim higher.

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

Project benefits are potentially large; they outweigh costs. The budget is reasonable and adequate.

Additional comments:

This proposal is good. There is nothing particularly creative here, but the science, monitoring, and management strategies represent a thorough effort.

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
<i>Excellent</i>	This proposal represents considerable thought and collaborative effort. The project has a high probability of success. Benefits are potentially large, and costs are relatively small.
Good XXX	
Poor	

CALFED Ecosystem Restoration Program External Review Form

Proposal Title: Cosumnes River Preserve Perennial Pepperweed Control Project

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

Most of the people connected to this proposal are housed on my Campus (UC-Davis)

Review:

1. **Goals.** Are the project's goals and objectives clearly stated and internally consistent? What ecosystem restoration benefits will it provide?

It is becoming quite obvious that perennial pepperweed is a “clear and present” danger to many riparian and marsh systems in California. As such it is an appropriate weed to target for control and research. In addition, the authors are right in arguing that the Consumnes reserve is an especially important site and the considerable investment already in its restoration needs to be protected. That said, however, the overall proposal was rather “hypothesis poor” and it was not really clear how implementation of adaptive management in Goal 3 was linked to the monitoring and experimentation in Goals 1 and 2. In particular, both the approaches for monitoring spread and the experiments proposed were not very innovative. This is surprising given a research team that shares a wealth of knowledge in both modeling and experimental design. I would have especially thought that a more thorough treatment of spatial processes and modeling would be in this project; there are new approaches available that should have been included or considered.

2. **Approach.** Is the approach well designed and appropriate for the project's objectives? Is it justified by prior site studies or other information documented in the proposal? If additional information is needed to adequately plan and design the project, does the proposal include adequate provisions for obtaining it during the project's design and environmental assessment? If not, what additional information should be gathered?

Unfortunately (because pepperweed is truly a growing problem) I think the project as proposed is weak in several aspects, especially in the monitoring and experimental design. In the monitoring phase, there are really no solid hypotheses presented as to how physical and biological factors might influence spread rates. I find it hard to believe that the investigators cannot develop specific questions or predictions to test with monitoring data on the effects of hydrology, soil and vegetation on pepperweed spread dynamics.

How this monitoring data will be used to create models of pepperweed spread is not clear. Given that there will be a substantial effort to age individuals in the various stands, I was very surprised that there will be no attempt to develop age/stage structured demographic models. This matrix or transition stage modeling approach has been used quite effectively for invasive species (e.g., Ingrid Parker's work) and would seem to be something the authors need to at least consider for pepperweed. Given the supposed spatial orientation of this proposal, another gap that was surprising was the lack of attention to the spatial aspects of age structure and demography. I might imagine that interanal patch structure (e.g., center vs. edge) or patch geometry might strongly influence survival, fecundity and seed bank formation. This spatial approach to pepperweed demography was not pursued in the monitoring section and given the intensive GPS approach proposed, this is really too bad.

As noted earlier, the experiments as proposed are not innovative and do not appear to build on what we already know about pepperweed control. As an indication of the somewhat simplistic nature of the design, flood plan position is lumped into wet vs. dry and stem density is just low or high. Both of these factors are continuous variables and thus should be included as covariates; a covariate/regression approach will likely improve power and will also allow greater capacity to interpolate expected pepperweed response. There is no apparent attempt to link the experimental treatment with a more comprehensive demographic analysis. For example, a more informative approach would be to examine the effects of various control measures on the elasticity dynamics and predicted population growth rates of age/stage structured models of pepperweed. Given that these experiments are to be intensively monitored (e.g., almost daily), the data required to create these demographic models could be readily obtained. Similar to the monitoring phase, there is no attempt to link spatial dynamics or structure changes in pepperweed populations to the experimental treatments. Again, given the supposed focus of this proposal on spatial dynamics, this seems to be a real gap. The authors state that they will monitor % cover and life history classes but how this data (especially life history classes) will be used to test specific hypotheses is not clear. Finally, given that there is previous information on control efforts of pepperweed at Cosumnes as well as other studies on pepperweed control, the authors should have conducted some sort of power analysis to estimate the number of experimental units that would be required to detect some level of effect.

3. **Feasibility.** Is the approach fully documented and technically feasible? Is the scale of the project consistent with its objectives? Does it reflect "best practices" for this type of project? If not, how should the project be revised to reflect "best practices"? Is it likely to attain the ecosystem restoration objectives it seeks?

There are some real gaps in description of experimental design especially with regard to how the data gathered will really answer questions on the spatial dynamics of pepperweed invasion. How the monitoring and experiments will be used to develop spatial models of spread or demographic models of population growth is very poorly developed. The authors need to employ the technical and modeling tools (e.g., matrix

models) that would allow a more sophisticated and comprehensive understanding of the effects of control measures on pepperweed population dynamics.

4. **Capabilities.** What is the applicants' track record in terms of past projects? Is the project team qualified to efficiently and effectively implement the project? Does the proposal describe how additional expertise and other support necessary to successfully accomplish the project will be obtained? If not, what additional expertise or support is needed?

This team has a good track record in previous projects. However, this proposal is not one of their best efforts. They really don't need any additional expertise; they need to think a bit more deeply about how to link monitoring and experiments to spatial dynamics of spread in pepperweed.

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

This proposal seems administrative heavy. I'm not exactly sure what all these people are doing. It would seem that the student assistants and the PGRs are doing most of the real work in the monitoring and experiments. This "top-heavy" structure is especially problematic given that there will also be supervision from Nature Conservancy personnel.

Additional comments:

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	This proposal represents a missed opportunity to apply cutting edge analysis and modeling to an important weed species. The team has the capacity to do a much better job in posing interesting questions and applying "cutting edge" analysis.
Good Marginal Good	
Poor	

CALFED Bay-Delta 2002 ERP PSP
Administrative Review
Budget Evaluation

Proposal number: 222DA

Proposal title: *Cosumnes River Reserve Perennial Pepperweed Control Project*

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

If no, please explain:

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

If no, please explain: Separate objectives are listed in the narrative of the proposal, but the budget summary does not separate out the costs for each objective.

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs? No.

If no, please explain: The justification does not say what expenses will be covered by indirect rates. It also seems like some items usually covered by indirect rates, are instead listed under "Supplies & Expendables" as separate expenses (postal services, copying charges, office supplies, space and campus meeting room rental). Very few "Field" supplies are listed under "Supplies & Expendables;" most noticeably absent are the cost for herbicides.

4. Are appropriate project management costs clearly identified?

Project management costs are included in the overall staffing budget as outlined in the budget justification, but the number of hours and budget for project management is not identified as a separate task in the budget summary.

If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary? No

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

The total of the 3 years in the budget summary (\$419,995.64) and listed again on page 20 of the narrative is \$1,000 more than the total requested on Form 1 (\$418,995.64).

6. Does the budget justification adequately explain major expenses? Yes

If no, please explain:

7. Are there other budget issues that warrant consideration?

The total project budget and staff time seems appropriate for the proposed objectives, but some discrepancies noted above need to be addressed if the project is approved. No soil testing is budgeted in the second year of the project.

If yes, please explain:

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