CALFED Bay-Delta ERP Panel Review
Selection Panel Review Form

Proposal Number: 151 DA
Applicant Organization: Sonoma Ecology Center
Proposal Title: *Arundo* Eradication and Coordination – Phase II

Recommendation: Fund As Is

Amount: $1,840,791

Conditions, if any (if there are no recommended improvements, please put "None"):
None

Provide a brief explanation of your rating:

The revised proposal was generally responsive to the comments of the Selection Panel. The proposers brought in additional technical expertise to assist with proposal preparation and project implementation. The new proposal abandoned the tiered approach of the first proposal, developed a conceptual model describing the effects of Arundo on riverine ecosystems. The proposal also provides three testable hypotheses (effects of treatment variables; active versus passive revegetation; and effects on stream channel capacity) that will be addressed. The proposal identifies key uncertainties.

The proposal better describes an adaptive management approach to both treatment and revegetation.

The proposal provides a proven strategy to coordinated eradication that now includes selection criteria to prioritize individual eradication project selection. Two willing partners were eliminated from the previous proposal by applying the selection criteria.

There is a strong, well-coordinated mapping component that will be invaluable in directing future eradication efforts. A more useable database will be developed. A permit assistance component is also described that will benefit future projects.

There was still some concern expressed by technical reviewers about the experimental design and statistical analysis of the experiments. . The selection panel notes that, despite concerns of one reviewer, the project team includes weed control experts familiar with herbicide use. On-going technical assistance from a bio-statistician is recommended by the selection panel to refine experimental designs as appropriate.

Several aspects of the proposal's budget require more specificity and justification to satisfy contracting needs, as outlined in the administrative review. It suggested that the budget may be able to be reduced. Coordinating expenditures with the contract for the current phase of the project is essential. Reducing the project coordinator and the data coordinator positions to half to two-thirds time should be considered. The purchase of

the two flail mowers and lap top computers should also be reviewed for necessity and conformance with applicable state policies. The Selection Panel agrees with the technical reviewers that the budget is reasonable for the work proposed, but it also recognizes that in developing a contract for the proposed work, the contracting agency will require additional information about these matters and that some cost savings may result.

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CALFED Ecosystem Restoration Program External Review Form

Proposal Title: Arundo Eradication and Coordination Phase II

Review:

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

   The goals and objectives are clearly described. Successful accomplishment of these goals will (a) reduce the continued spread of A. donax; (b) reduce areal coverage and impacts of current infestations; and (c) provide valuable information on coordination of a large regional eradication program.

2. **<u>Approach.</u>** 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 thought out and address some of the most important questions regarding both eradication and restoration. However, hypothesis 1c probably should include evaluation of distance from stream(s) and ability to restore these sites. It currently only seems to pertain to efficacy of treatments. Likewise, stream channel capacity (Hyp. 3) is only one variable; channel stability ought to be assessed as well. This is somewhat restricted by the three-year term, but some measure as baseline could be added.

   Specific comments:

   a. Re methods: Though the use of chlorophyll meter may be interesting, the real criteria should be- Has the colony been killed; have the treatments resulted in arrested productions of new shoots and rhizome sprouting? Unless this measurement is correlated to remote sensing systems and their interpretations, it does not seem needed.
   b. The correct spelling is imazapyr , not imazipyr (sic)
   c. I suggest including an assessment of "foliar" condition, specifically what effect does accumulated particles (e.g. dust) on foliage have on herbicide efficacy. Glyphosate particularly can be inactivated by presence of soil/clay particles on leaf surfaces. One could easily compare "washed" and "unwashed foliage", and even time applications to follow recent rainfall if that were to increase uptake/efficacy.

d. Re Hyp. 2: Since A. donax alters substrate conditions significantly, and since these conditions affect the abilities of desirable vegetation to establish (or recover), this proposal would be strengthened by incorporating periodic (monthly or quarterly) sediment sampling and characterization (%OM, decay of roots/rhizomes, presence of new plants- though the latter will be determined by the veg. Surveys). In order to understand why one condition (e.g. distance from stream) may facilitate efficacy or restoration, it follows that quantifying changes in canopy and sediment would be extremely helpful. This may also be useful in assessing Hyp. 3- stream channel effects.

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 at the levels of funding and resources identified. With the inclusion of imazapyr it encompasses the more likely available herbicides. However, I note the lack of citations of work on another grass- *Spatina alterniflora*- by Kim Patten- see comment below re weed science advisors.

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 partners and subcontractors have shown sufficient expertise and experience in the critical areas of this project, including the crucial coordination tasks. I would suggest that additional weed science expertise be included- particularly regarding use of both glyphosate and imazapry. This could easily be accomplished by including one or two more advisors (i.e. Steering Committee).

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

   This is a large budget, but it does reflect the need for regional approach and for a comprehensive assessment of methods and results.

Additional comments: The partners may want to connect with US Bur. of Rec. personnel re sections of the SJ River where other projects on invasive weeds may be initiated (e.g. against *Myriophyllum aquaticum* and *Ludwegia peploides*). Likewise, the CA. Dept. of Boating and Waterways has large-scale remote sensing surveys underway for the Sac. SJ Delta, including many areas where A. donax occupies parts of levees.

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 X	This project is well- designed and contains the key elements of experimentations and assessments needed to provide answers to help eradicate or at least reduce impacts form A. donax. It also contains adequate modes for adaptive management and readjustments to the program. There are a few suggestions noted that I believe would provide more useful information – particularly regarding herbicide efficacy and understanding conditions for restoration.
Good	
Poor	

CALFED Ecosystem Restoration Program External Review Form

Proposal Title: 151 DA *Arundo* Eradication and Coordination – Phase II, Sonoma Ecology Center – Team Arundo del Norte

Review:

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

   With the exception of the first goal, all goals and objectives are clearly stated and internally consistent. Goal one is to "Eradicate Arundo and restore riparian and aquatic habitat at sites where restoration will contribute to recovery of sensitive species, habitats, and ecosystem processes of concern to CBDA, and protect property and working landscapes." Perhaps this could be more clearly stated in two or more goals.

2. **<u>Approach.</u> 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 strength of the proposal remains in the commitment to a coordinated approach for *Arundo donax* control. The approach appears to be appropriate and effective based on the success of previous efforts as evidenced through continuation of funding.

   The scientific approach, while greatly improved, remains weak. Although science is not he focus of the proposal, the success of the project will be measured by the efficacy of eradication. Therefore providing a framework to compare the efficacy of various eradication treatments is essential.

   The information provided summarizing the state of knowledge to date needs more detail to provide a rationale for the approaches outlined in the proposal. With respect to adaptive management, it is not clear how current monitoring complements the program. The proposal team states that current monitoring is inadequate to test hypotheses regarding *Arundo* control, however, no strategy for improving the monitoring done by partners is provided. Partner participation in all aspects of *Arundo* control is key to the success of this type of grass roots coordinated project. It is important that an additional monitoring approach is proposed using a subcontractor, however, this is secondary in importance to a solid monitoring protocol being an integral part of the entire process. Community groups and their coordinators can monitor and collect data effectively and providing the guidance and training to these

groups needs to be one of the objectives of Team Arundo del Norte's work to make the project successful.

The experimental design and monitoring is improved, particularly with respect to the design for hypothesis 1. Because hypothesis 1a is to examine the effects of herbicide and dosage on *Arundo*, the use of more than 2 herbicides as well as varying the dose of more than one of the herbicides would improve the experimental design. If the current literature on herbicide use for *Arundo* control was summarized in greater detail the rationale behind what appears to be a less than adequate design may be clearer.

The approach for Hypothesis 2 (effect of active versus passive revegetation after eradication treatment) is not adequate. It is not apparent how the first approach outlined will contribute to testing the hypothesis as there is no comparison of actively versus passively revegetated sites. Approach 2 alludes to comparing active versus passive regeneration, however an analysis of covariance rather than linear regression would be the appropriate analysis to compare treatments. As written the proposal team is testing whether or not sites have more vegetation over time and therefore is not testing the hypothesis with this approach.

The approach for Hypothesis 3 is a start and an improvement from a previous version.

3. **<u>Feasibility.</u> 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 approach is not fully documented as outlined above. It was not possible to determine whether or not "best practices" for this type of project are proposed. A more thorough and informative review of the literature would make this possible. A commitment to improving the efficacy of cooperators in all phases of the project, particularly monitoring, would greatly improve the proposal. Improved experimental design would also result in the project being more likely to meet its objectives.

4. **<u>Capabilities.</u> 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' prior work on Phase I of the project has been reviewed favorably. Close coordination among team members will be essential to project success. It is not apparent from the proposal that the team has been working closely.

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

It is difficult to be convinced that the project coordinator and data coordinator positions are 40 hour per week, 52 week per year positions. They are more likely 60-75% time and the budget should reflect this.

The amount of funding requested by the subcontractor, David Spencer, of the UDSA ARS is unreasonable in light of the contribution to the project. Although it is not made clear in the budget justification, it appears that funds are requested for a PGR (post-graduate researcher?) to be employed full time to work on the project (with the additional help of student assistants). Again, the tasks detailed in the proposal do not require this level of personnel commitment and the budged should be adjusted to reflect this.

Additional comments: It would be useful to compare the budgets from previous submissions with the current budget. The current proposal has eliminated much of the work proposed earlier and this should be reflected in the level of funding requested.

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	The proposal deserves and overall rating of Adequate. The current proposal is an improvement over previous versions. There are fewer errors and inconsistencies in the text and some comments from previous reviews have been addressed. The proposal continues to have shortcomings with respect to the approach and budget. However, the coordinated approach to *Arundo donax* control is innovative and promising.
Good	
Poor	

CALFED Ecosystem Restoration Program External Review Form

Proposal Title: Arundo Eradication and Coordination-Phase II

Review:

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

   As I noted in my previous review of this proposal, it is pretty obvious that *Arundo* is a significant weed problem that will have severe impacts on riparian systems in the State if left unchecked. In addition, as noted by the authors of this proposal, the apparent inability of *Arundo* to produce viable seed makes the goal of eradication a feasible one. So the overall control and eradication goals are good ones. However, the weakness in this proposal remains in the experimental portion of proposed work. I am willing to defer to the authors' judgment in their assertion that the focus of control experiments should be on the use of herbicides (and not other control methods such as solarization). However, even when focusing on herbicide control, there are still some real problems in the experimental design that will reduce the capacity of the authors to generalize their results across different environmental conditions. In essence this problem relates to the inability of their experiments to address the interactive effects of factors such as herbicide dose, application timing, or riparian zone because the experiments are separate one-way ANOVA designs and not factorial experiments (see below). There is still a lack of integration across the separate experiments and a lack of clarity of how all the separate experiments will really be pulled together at the end. As a result, the goal of being able to make management recommendations for control of *Arundo* across the region is not likely to be met.

2. **<u>Approach.</u> 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?**

   As noted above the primary problem with this proposal is in experimental design. Although the authors have addressed some of my earlier concerns (e.g., what are replicates and what are subsamples), there are still significant problems. The biggest problem with the current design is the piece-meal one-way ANOVA approach to testing factors affecting *Arundo* removal. Apparently (Table 1), each factor in Hypothesis 1 is tested separately (e.g., herbicide dose, application timing, and riparian zone). There is nothing technically wrong with this but it will not answer the important questions on *Arundo* control that will require knowledge of the *interactive* effects of these factors. For example, important questions might be how the action of

Imazipyr relative to Glyphosate changes with season of application (two-way interaction) or perhaps how effects of application timing depend on riparian zone (another two-way interaction). Even more complex questions on how the relative effects of the two herbicides change with season and riparian zone (three-way interaction) are also likely to be important to managers. Unfortunately the current experiments cannot address these interactive effects with a series of separate one-way ANOVA designs. The authors need to put together a factorial design that can address the important interactive effects and, by the way, will be much more efficient in terms of allocation of experimental units. In addition, there needs to be a consideration of how to combine all the experiments conducted at each site (a hierarchical design approach) so that the overall statistical power of the experiment is greatly increased and the potential effect of partners' site can be statistically incorporated into the analysis.

In testing Hypothesis 2, the authors have somewhat addressed my earlier concerns about this section's lack of integration into the experiments of Hypothesis 1. In the "do nothing" treatment proposed there is the statement that the rate of recovery estimates from the regression approach will be compared across herbicide treatments. (By the way, the non-independence of the plots across time argues for a repeated-measures analysis here.) There is also the plan to incorporate active revegetation treatments into the treated areas. However, I am still not sure how this will be done. For example, if each *Arundo* clump is considered an independent experimental unit in the Hypothesis 1 treatments, how will the large (5m x 5m) revegetation plots be "mapped" onto individual clumps (which may be closer that 5m to each other)? Finally, similar to the experiments in Hypothesis 1, the lack of a factorial design and a method to combine results across sites significantly reduces the predictive value of these experiments.

3. **<u>Feasibility.</u> 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?**

   As far as I can determine, the proposed experiments of Hypothesis 1 are feasible but inadequate. To obtain information on "best practices" the experiments need to be recast in a factorial design to better allow extrapolation of results to other sites. It is not clear from the description provided in the Hypothesis 2 section that the revegetation treatments proposed in Hypothesis 2 can really be linked properly to the experiments of Hypothesis 1.

4. **<u>Capabilities.</u> 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 overall team has a very good track record in outreach and education. My recommendation at this point (repeated from last review) is for them to consult with a good statistical consultant on how to design their experiments in order to really answer the important questions that they have identified. As I suggest above, this design is likely to be a factorial, hierarchical ANOVA with factorial treatments nested within sites.

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

   Budget appears adequate.

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	**Although it is clear that the authors recognize that factors of herbicide type, application timing, riparian zone, and revegetation treatment are important in *Arundo* control, they cannot examine the interactive effects of these factors in their experimental design. This simplistic "one-way ANOVA" approach is inadequate to address the important questions in Arundo control and severely reduces the capacity to generalize results across different sites and conditions. This problem is "fixable" with a proper design.**
Good **xxx**	
Poor	

CALFED Bay-Delta Directed Action
Administrative Review
Budget Evaluation

Proposal number: 151DA

Proposal title: Arundo Eradication and Coordination – Phase II

Note: The Phase I project number listed in the proposal is not the ERP project number, but the USFWS agreement number. The Phase I ERP Project number was **ERP-00-F11.**

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

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

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

4. *Are appropriate project management costs clearly identified?* Yes

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

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

   A. The Data Coordinator would not have a portable laptop until the 2nd year of the agreement, but would have computing software purchased all three years of the project. Is this software for use on an existing desktop for data coordination? Are laptops for both the Project Coordinator and Data Coordinator necessary?

   B. Under Services or Consultants on the Budget Justification, a Manufacturer maintenance contract is listed for Task 16, Equipment. What is the need for the purchase of this contract? Is this for the Flail Mower Attachment units listed under Equipment? On page 37 of the proposal, "Funding for equipment purchases will be in lieu of work performed by the operator for eradication partners in that region" is stated. Is this an allowable option?

7. **Are there other budget issues that warrant consideration?** Yes. The Phase I project referenced in this proposal will continue through March 2006. Will the Project Coordinator for this proposed project be the same person coordinating the Phase I project through March 2006? If so, how will 2 full-time salaries for the same person be accounted for?