

**Review:**  
**Invasive *Spartina* Project (ISP)**  
**CALFED Proposal 2001-B203-2**

I. Overall Evaluation and Narrative Comments

1. Overall Evaluation: Very good to excellent (comprehensive coverage of feasibility, cost, effectiveness, benefits, logistics, cost:benefits).

2. Comments.

The Invasive *Spartina* Project (ISP) as proposed has exceptionally high importance for the conservation and restoration of the San Francisco Bay estuary, and a uniquely qualified team (essentially peerless within this region) of scientists and natural resource managers to deal with the problem). The project is necessary to prevent the spread of a “keystone invader” which could preclude successful restoration of tidal wetlands of the estuary, and it may be sufficient to accomplish this if it is undertaken in full force. The scope of the project is appropriately comprehensive, including hybrid detection, containment of pioneer leading-edge colonies, intensive eradication of selected marshes, and post-eradication management. The project will almost certainly succeed at pulling back the incipient invasion of the North Bay area. The focus on the introgression aspects of the invasion is appropriate and of great practical importance in determining the scope of effective eradication methods.

The documentary aspects of the project (monitoring and research) are also appropriate and probably essential to the long-term progress of the eradication program. Much of the impact assessment of non-native cordgrass in the San Francisco Bay estuary has been the province of professional judgement and analogy with similar invasions in other estuaries. Research on shorebird impacts of tidal wetlands invaded by *Spartina alterniflora* will provide important empirical data quantifying ecological consequences of habitat conversion. The (new) aerial photography components are an extremely useful data-rich, efficient mode of monitoring, and should be expanded from priority control sites to a subregional level if possible. Geographic evaluation and mapping of ecological risks of the invasion has been performed previously, however (in fact, by the SFEI and the Goals Project), and may be somewhat redundant given the high degree of professional expertise already infused in the project’s planning. The functions of the website (sharing information) in relation to the basic purpose of the project (halting spread and eradicating non-native cordgrass) also seem to be more presumed than explicit, and are not distinguished from the benefits of publishing results in the scientific literature or applied scientific restoration/management literature. Given the substantially greater costs for database and web-related tasks in the budget (nearly \$200,000 year 1 for mapping/monitoring/assessment, nearly twice the cost of genetic research or experimental control method development, and more than triple the itemized cost of *Spartina* control at 4 large demonstration sites!) explicit justification would be appropriate. Is there an assessment of the public and professional request or need for narrow disciplinary technical information on eradication methods which may be performed only by permitted professionals? Also questionable is the efficiency of reliance on workshop participation rather than on current field surveys, and coordination with selected land managers and experienced resource agency staff. In contrast, the training and public outreach components (manuals, pamphlets, etc.) would have immediate utility. This is a criticism not of deficiency, but of possible excess beyond sufficiency, and is not coordinate with criticism of error, omission, etc.

The inclusion of budget for toxicology (to address public concerns over herbicides) and compliance with environmental review processes is prudent and fully justified, since these aspects, if treated as peripheral management issues, could defeat all progress in the project. The emphasis on the public education/outreach aspects to a broadly interested audience is well-placed, and should be distinguished from the effort to make narrow, complex technical data available to an audience of unknown but small size on a website.

The CALFED criterion for demonstration of feasibility is somewhat circular in application to the ISP, since its basic purpose is to demonstrate the feasibility of eradication of invasive *Spartina* at ecologically significant scales. The proposal cites sufficient indirect evidence of its feasibility to address this criterion by referring to the older *Spartina* eradication programs of Washington and Oregon. The demonstration aspects of the ISP somewhat compensate for the limited number and size of areas targeted for eradication. Once the efficacy of control methods are developed for these sites, the available precedents and technology should expedite subsequent expansion of the eradication program to cover the remainder of the estuary.

## II. CALFED Criteria for Evaluation

### 1. Scientific merit.

a. Clearly stated objectives and hypotheses. The ISP's genetic analysis of the hybrid swarm *Spartina alterniflora/S. foliosa* is a key element of the hypothesis regarding the introgressive extinction hypothesis for *S. foliosa*, and will, provide a critical test of this mode of extinction while at the same time preventing it. Other hypotheses which will be tested through the ISP will relate to patterns and rates of vegetation succession following *Spartina* eradication, trends in shorebird use of invaded tidal wetlands. The proposal itself did not explicitly articulate these hypotheses in the required section (c.), but did so clearly enough in other sections.

b. Sound approach. All aspects of the project relating to strategy and techniques of eradication are not only based on the most sound applied science available, but much of it is proposed to be conducted by leading experts in the field. The "conceptual model" criterion of CALFED is somewhat superfluous in this context, since more advanced scientific research beyond the "conceptual model" level has been established for the regional *Spartina* invasion by Don Strong's lab. The range of critical issues covered in the ISP's approach is fairly comprehensive (shorebird impacts, post-eradication succession, toxicology of herbicides, experimental eradication techniques), and is lacking only in geomorphic impacts of the *Spartina* invasion.

c. Adaptive management approach. This approach is "adaptive" by definition in relation to non-native *Spartina* invasion of the Pacific coast, and has been so for well over a decade. What distinguishes the ISP is not the adaptive relation between result and practice, but by the avoidance of redundant, ad hoc "adaptive" eradication results, through the systematic structuring of an entire program. In contrast, much of the early San Francisco Bay non-native *Spartina* eradication research involved relatively small-scale experiments and methods which did not fall systematically within a potential expanded regional eradication program. The ISP offers genuinely integrated research, and an aim for practical regional application.

**Targeted Research:** This criterion is met by the USDA herbicide research component, the genetic analysis component, and the shorebird impact study.

**Pilot or Demonstration Project:** The heart of the project is the eradication component, focused on removal of pioneer (outlier) colonies, and the essential environmental review process that will facilitate (enable) all future invasive *Spartina* eradication measures to be evaluated and implemented efficiently. It is unfortunate, but probably inevitable, that more site-specific eradication project proposals could not be developed at this stage of the grant proposal preparation.

2. **Adequacy of monitoring, information assessment, and reporting plans.** The prospects of the proposals empirical data collection (shorebirds impacts, genetic analysis of the invasion) appear to be strong, particularly in view of the qualifications and research histories of the collaborators. The aerial photography

(and rigorous cartographic methods) component of the ISP would itself be sufficient to guarantee useful, durable long-term data collection. The information reporting component of the ISP is more than sufficient, and could possibly be superfluous in some aspects: it was proposed without reference to need or demand, and appears to reflect technological capacity and availability more than principles of efficiency or parsimony related to the project's basic purpose.

3. **Technical feasibility.** As documented in the proposal, there is a well-developed body of both applied research in the Pacific Northwest (eradication strategy and methods), and local, pure scientific research in the bay area (genetic aspects of invasion), which justify the technical feasibility of the approach, methods, and expertise gathered in the project.

4. **Qualifications.** This is in my view the greatest strength of the proposal: no amount of "adaptive management", "conceptual model" adequacy, or monitoring and reporting planning in themselves could possibly provide the weight of credibility to the project that is offered by the talent and expertise assembled in the ISP. It is not exaggeration to state that the qualifications of the contributors and managers of the ISP could not be exceeded.

Rating: Very Good to excellent