Summary Information

Sonoma Ecology Center

Arundo donax eradication and coordination program: monitoring and evaluation

Amount sought: $396,352

Duration: 36 months

Lead investigator: Mr. Mark Newhouser, Sonoma Ecology Center

Short Description

This project will implement the monitoring of Arundo eradication sites for restoration success. Funding is requested to support two additional years of monitoring so that monitoring continues without interruption. This work will be carried out at all 10 partner projects of the Arundo Eradication and Coordination Program (Arundo Program), which is managed by the Sonoma Ecology Center

Executive Summary

Ecosystem Restoration Program – 2004 Monitoring and Evaluation Proposal

Executive Summary

Arundo Eradication and Coordination Program

Team Arundo del Norte,a network of local, state, and federal organizations dedicated to the eradication of Arundo donax (Arundo, giant reed), has been conducting the Arundo Eradication and Coordination Program in an effort to gain control of this harmful riparian invasive throughout the Bay−Delta region. In this proposal TAdN takes the next steps toward understanding the effects of invasive species eradication in the context of ecosystem restoration, by implementing the monitoring of Arundo eradication sites for restoration success.

This opportunity for funding expanded monitoring is timely as the program’s five additional partners will soon begin initial surveying and eradication monitoring. The proposed initiative will allow all ten partners to collect more valuable data within the already planned projects under Phase 2. Funding is requested in this proposal to support two additional years of

monitoring so that monitoring continues without interruption.

This work will be carried out at all 10 partner projects of the Arundo Eradication and Coordination Program (Arundo Program), which is managed by the Sonoma Ecology Center. Phase 1 partners (beginning in 2001) include: Napa River, Putah Creek, San Francisquito Creek, Sonoma Creek, and Walnut. Phase 2 partners (proposal approved; funding pending) include: Upper Cache Creek, Lower American River, Lindo Channel, San Joaquin River, and Gray Lodge Wildlife Area. All partners are located with the California Bay Delta Authority's (CBDA) Geographic Scope.

The TAdN project proposed herein takes a coordinated regional approach to ecosystem restoration that promises to benefit not only partners in TAdN's Arundo program, but also weed projects throughout the CBDA region and beyond.

The following two objectives support the project's main goal of monitoring restoration success:

1. Development of a standardized monitoring protocol and data system to support a multi−program monitoring effort.

TAdN and several other agencies have already formed a partnership to develop a standardized monitoring protocol for restoration success that is based on an already existing system developed by The Nature Conservancy called WIMS, or the Weed Information Management System. Other partners include the California Department of Food and Agriculture (CDFA), the US Fish and Wildlife Service's Reserve System (USFWS), the California Weed Management Areas (CWMA), and the Information Center for the Environment (ICE). Representatives from each agency have formed a WIMS Development Team that will coordinate developing the protocol, in coordination with TAdN's Steering Committee (a group of scientists and weed managers that has advised TAdN in all its work over the past five years; see Appendix A). They will make decisions of what data to collect, how to collect it, and how the data will be analyzed to understand restoration success. They will also oversee the testing of the new protocol in the field at selected eradication sites. It is expected that the resulting monitoring protocol and data system will be ready for use within one year after the project begins, and available to all weed projects.

2. Training and technical support of the partners in their efforts to carry out the monitoring.

Once the new monitoring protocol and data system is ready for use, Arundo Program partners will be provided with the protocol, database, and field equipment (hand−held computers or PDAs) and receive training in their use in a three−day workshop. Then they will begin using it at their eradication sites. The TAdN Data Coordinator will provide all partners with

individual assistance by phone (an on−line help desk) and in person, as needed. Regular site visits by Arundo Program coordination staff will support users in accurate data collection and timely reporting. All partner data will be added to a new TAdN map server on the TAdN website (http://teamarundo.org).

Monitoring data from the ten partner sites will be analyzed yearly in support of adaptive management decision−making within and across partner projects, and also at the end of the five−year monitoring period to evaluate restoration success at a regional scale. All data will be integrated with the Bay−Delta and Tributaries Database.

Ecosystem Restoration Program – 2004 Monitoring and Evaluation Proposal

Executive Summary
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***Arundo donax* Eradication and Coordination Program**
A Project of Team Arundo del Norte

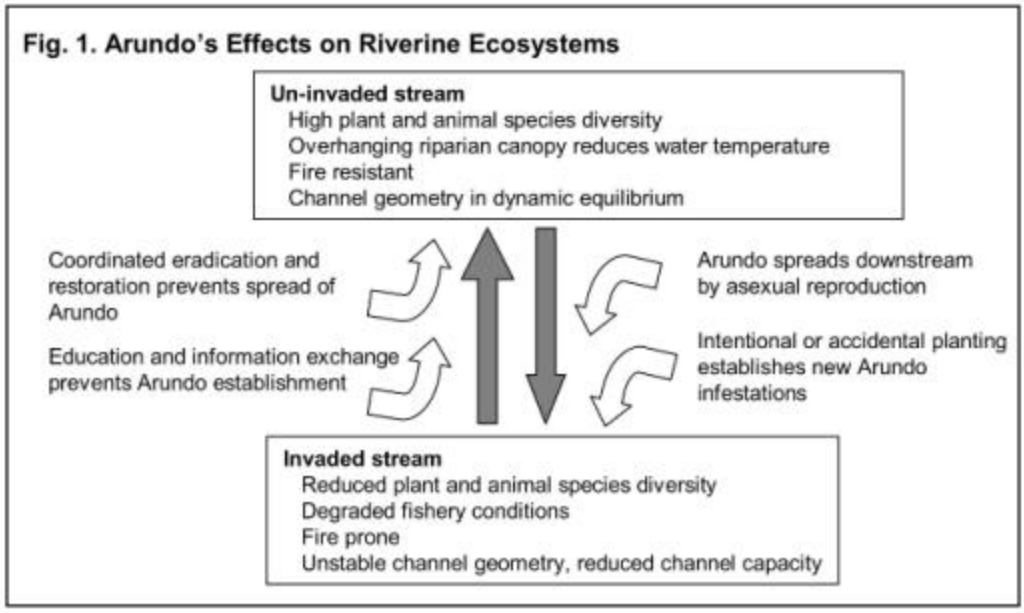
CALFED Monitoring and Evaluation Proposal, November 2004

A. PROJECT DESCRIPTION: PROJECT GOALS AND SCOPE OF WORK

A1. PROBLEM, GOALS AND OBJECTIVES

PROBLEM

1. *Arundo donax* is a noxious weed that threatens the ecology of riparian areas.
The non-native invasive grass *Arundo donax* (Arundo, giant cane) threatens the ecological integrity of the rivers and streams throughout the California Bay Delta Authority (CBDA) region by altering ecosystem processes and negatively affecting native species (Fig. 1). Arundo's effects on native systems and its modes of reproduction are well documented (Douce, 1993; Iverson, 1993; Dudley and Collins, 1995; Frandsen, 1993; Else, 1996; Bell, 1997; Trumbo, 1998; Boose and Holt, 1999; Gaffney, 2002).



2. There is a need to monitor the success of restoration efforts, beyond immediate eradication work.
The purpose of invasive species eradication is to reverse degradation of habitat by the invaders, which are known to out compete native plants and replace valuable habitat with monocultures of species unsuitable for native vertebrate and invertebrate species (Rieger & Kreager, 1989; Dudley and Herrerra, 2003; Begon, et. al, 1995). Numerous projects across the region are underway to eradicate Arundo, and short-term eradication successes are being reported. Eradication sites are being monitored for regrowth and the need for follow-up treatments; however, little or no monitoring is being done of other parameters that would be useful in evaluating overall ecosystem recovery as an effect of weed

2. Training and technical support of the partners in their efforts to carry out the monitoring.

Once the new monitoring protocol and data system is ready for use, Arundo Program partners will be provided with the protocol, database, and field equipment (hand-held computers or PDAs) and receive training in their use in a three-day workshop. Then they will begin using it at their eradication sites. The TAdN Data Coordinator will provide all partners with individual assistance by phone (an on-line help desk) and in person, as needed. Regular site visits by Arundo Program coordination staff will support users in accurate data collection and timely reporting. All partner data will be added to a new TAdN map server on the TAdN website (http://teamarundo.org).

Monitoring data from the ten partner sites will be analyzed yearly in support of adaptive management decision-making within and across partner projects, and also at the end of the five-year monitoring period to evaluate restoration success at a regional scale. All data will be integrated with the Bay-Delta and Tributaries Database.

eradication. Indicators such as percent cover of native plants and invasion by new weed species are needed to address the larger issue of ecosystem restoration success rather than simply monitoring the eradication of a single problem species. Longer monitoring time periods are needed in order to collect enough data for patterns to emerge.

3. Monitoring is difficult for individual programs to implement, and coordination is necessary for regional data sharing and analysis.
Collection of quality monitoring data in a format useful for analysis and compatible with those of other CBDA projects is difficult for individual programs to accomplish. For a variety of reasons from technical challenges to simple time constraints, weed managers are not consistently collecting and reporting sufficient data to provide for analysis of restoration success within and across programs in the Bay-Delta region. The lack of a standardized monitoring protocol and data model impedes quality data collection and regional sharing. Weed programs often lack the technical expertise to implement a standard protocol if one was identified. Data collection and management tools that are easy to use in the field, training, and support at all phases of monitoring, and a high benefit-to-burden ratio are necessary to overcome barriers to the collection of monitoring data.

GOALS AND OBJECTIVES

The goal of this project is to implement monitoring of Arundo eradication sites for restoration success. In support of this goal, project objectives are:

1. Development of a standard monitoring protocol and data system to support a multi-program monitoring effort
2. Training and technical support of the partners in their efforts to carry out the monitoring

This project builds upon work done or planned under Phases 1 and 2 of the Arundo Eradication and Coordination Program (Arundo Program). Phase 1, begun in 2001 and still in progress until March 2006, provides for eradication and the basic monitoring of eradication success. Phase 2, awarded September 2004 but not yet funded, expands upon Phase 1 monitoring by tracking other weed species and monitoring for a longer time period of five years *total* for Phase 1 and 2 partners. Five additional partners are added in Phase 2 for a total of ten partners in ten watersheds.

Toward the first objective, the development of a standard monitoring protocol will be accomplished within the context of the weed management community with the guidance of plant community ecologists that are now members of Team Arundo del Norte or have been asked to participate. The protocol will monitor changes in plant community structure and species composition at and immediately surrounding the sites at which Arundo was eradicated, and will employ standard vegetation description techniques and photo documentation. The protocol and associated instructions will be geared toward use by lay observers and will be designed for maximum repeatability across disparate situations and observers.

The monitoring protocol will be supported by a database application for ease of data collection and control of data quality. Recently, in order to offer the most robust and well-supported weed mapping toolset for Phase 1 and 2 purposes, Team Arundo del Norte teamed up with an existing effort by The Nature Conservancy and its Weed Information Management System, or WIMS, project. This partnership is being joined by others, including the California Department of Food and Agriculture (CDFA), the California Weed Management Areas (CWMA), the California Invasive Plant Council's Weed Mapping

Committee, the US Fish and Wildlife Service's Natural Reserve System (USFWS), and the Information Center for the Environment (ICE). Adoption of or interest in the WIMS application by these organizations is due in part to the fact that the system serves many of the data management needs of any weed eradication project, and in part to the recognition that the common use of one well-designed data system 1) greatly consolidates expensive technical support, and 2) simplifies data sharing and regional data analysis. This project proposes to offer data management support to partners by improving and expanding upon this data management system. Specifically, the project will add the capacity for monitoring restoration success and further enhance its ease of use. Software development proposed herein will be carried out in the context of the WIMS Development Team for a professional quality end product that is used by multiple agencies.

In the second objective, the project will train users in the collection of high-quality monitoring data using this improved system in two 2-3 day workshops that include desktop computer training as well as field data collection training. Set-up and use of the WIMS handheld-computer data collection techniques, proper evaluation of plant community attributes, identification of invasive and native riparian plants, and management of collected data will be covered in detail in the workshops. The project will provide assistance to the monitoring partners in every aspect of data collection to ensure the data is collected successfully and becomes part of the regional clearinghouse. Technical support will be offered in online documentation as well as intensive individual assistance by phone and in person. Communication with the partners will be ongoing through the collection, management, quality check, and interim analysis phases to avoid pitfalls that may lead to gaps in data in the regional clearinghouse.

Partners are provided funding to accomplish the work of monitoring at their own Arundo eradication sites according to the protocol developed and supported by this program. Monitoring observations will be made at least once per year at the time of weed mapping and/or treatments. Partners will be able to utilize their own databases to track their progress and make internal management decisions. All required monitoring data collected by partners will be submitted electronically to SEC, where it will be entered into the regional clearinghouse database, quality checked, analyzed, and reported.

A2. JUSTIFICATION

HYPOTHESES

This proposal is based on the following hypotheses:

1. Partnering with resource agencies and organizations to codevelop a vegetation monitoring system will result in a superior monitoring protocol and lead to broader adoption and use.

2. An improved data management system and increased technical support will result in more consistently collected and higher quality data.

3. Successful weed control and revegetation will result in restoration of habitat for species listed in the CBDA ERP Multi-Species Conservation Strategy.

Restoration success monitoring is best done by program partners because they are carrying out the work of eradication and weed monitoring. It has been observed, however, that partners can have difficulties in successfully carrying out data collection because of lack of time, funding, and technical expertise. This project addresses a number of needs identified during Phase 1 project implementation that are barriers to

the successful collection and coordination of weed eradication project monitoring data. An adaptive management approach to removing these barriers is proposed, as well as a plan to provide for the collection of additional data that will monitor restoration success.

Identified needs and proposed solutions are outlined in the table below.

Table 1. Proposed Solutions to Identified Needs

Needs	**Proposed solutions**
Simplified data collection, high data quality and consistency.	Provide a data management system that is easy to use, is flexible for varying levels of technical expertise, and that allows digital data collection in the field with handheld computers. Simplify the interface and provide clear, unambiguous instructions. Provide each partner with a hand-held computer for field data collection.
A data management system that benefits project managers.	Provide database elements that track, compare, and report basic project information that land managers need, such as costs of staff and materials, landowner contact and land access information, and volunteer time. A data system that offers assistance in day-to-day project management is more likely to be used.
Expanded partner training and support.	Provide in-depth training (2-3 day workshops) in the use of the new monitoring protocol and data management system. Ensure accurate, timely, and complete data collection and reporting with closer coordination and one-on-one support, including visits to the partners' project locations. Provide support materials and discussion forum online and a help desk to which partners may call for assistance.
Monitoring of indicators of restoration success.	Modify the weed information management system to provide for collection of data pertaining to overall vegetation management, not just eradicated weed populations. Add the capacity to track plant community species composition and structure—including native and nonnative plant species—as well as characteristics such as changes in plant vigor. These data will allow for evaluation of success of weed control and revegetation actions. Ability to track multiple invasive plant species, native plant species, plant condition, and native/non-native plant cover will provide key indicators of restoration success.
Longer monitoring time periods.	Fund two additional years of monitoring, to allow completion of five-year monitoring period begun in Phase 2.
More reliable and functional NIS database software and more responsive technical support system.	Collaborate with multiple agencies on invasive species data management techniques. Create a partnership to pool resources and share costs for data management system programming, user support, response to user feedback, and future system upgrades. Collaboration will reduce costs to individual programs and develop a single, robust data management system and user support network.
Interoperability with data from other Bay-Delta programs.	Coordinate data models, standards, and exchange formats and create a plan for sharing and consolidating data with Bay-Delta region programs using other systems or gathering similar monitoring data.

A3. PREVIOUSLY FUNDED MONITORING

Arundo Eradication and Coordination Program, Phase 1

Phase 1 includes three years of monitoring for original partners. Monitoring is limited to tracking Arundo eradication.

This phase of the program began in May 2001 with five partner projects located in the California Bay Delta Authority (CBDA) region, including Napa River, Sonoma Creek, San Francisquito Creek, Putah Creek, and Walnut Creek. Since that time, partners have secured permissions for landowner access, conducted initial surveys, mapped the location of Arundo infestations, and done eradication work. Most projects have also conducted some monitoring and active revegetation. All partners have used the surveying and monitoring protocols established by Team Arundo del Norte (http:teamarundo.org). To date, partners have secured permissions on 162 properties, mapped 40, treated at least 70 sites (some sites overlap multiple properties), and conducted monitoring on 107 properties.

Arundo Eradication and Coordination Program, Phase 2
Phase 2, which will begin upon contract signing, includes two additional years of monitoring for original partners and three years of monitoring for new partners. Monitoring includes other non-native species in the vicinity of Arundo eradication sites.

In Phase 2 of this program, current partners will continue eradication, post-treatment monitoring, and restoration work. Five new partners will be added to the program and will begin surveying, mapping, and then eradication work. The new partners are also located in the CBDA region and include Upper Cache Creek, Lower American River, Lindo Channel, San Joaquin River, and Gray Lodge Wildlife Area. We estimate that within the three-year period of Phase 2, a total of approximately 223 acres of Arundo will be eradicated by these ten partner projects.

Current Monitoring and Evaluation Proposal
This proposal seeks to expand monitoring to track overall plant community composition and structure, in order to evaluate restoration success in weed eradication sites.

A4. APPROACH AND SCOPE OF WORK

The proposed project will implement monitoring of habitat restoration at *Arundo donax* eradication sites at a higher level of detail and for a longer time period than planned in Phase 1 and 2 of the Arundo Program. In addition to previously-planned monitoring in 10 watersheds of the eradicated species, the project proposes to track change over time in native and invasive plant cover and plant community species composition. Active revegetation activities will be logged and described along with other treatments to the site, such as eradication of Arundo and other weeds that may be originally present at the site or subsequently spread into the area where Arundo has been removed. The resulting expanded dataset will support analysis for evaluation of Hypothesis #3: Successful weed control and revegetation will result in restoration of habitat for species listed in the CBDA ERP Multi-species Conservation Strategy. Restoration of habitat will be defined as observable trends toward native riparian plant communities. Indicators of these trends are: higher percentages of native plant cover, lower percentages of invasive plant cover, and higher numbers of native species compared to invasive species.

To facilitate restoration monitoring, the proposed project will address several problems identified as barriers to complete and timely data collection and delivery. First, the project will fill the need for a plant community monitoring protocol that can be reliably and consistently implemented by weed eradication partners, making it possible for this level of monitoring to become integrated into the eradication work. This new protocol and support system will eliminate the need for a separate data

collection team and the additional coordination work associated with gaining access to the eradication sites, many of which are located on private land. The monitoring protocol will be based on accepted quantitative monitoring protocols for riparian plant community characteristics known to affect habitat quality and instream conditions, such as the California Department of Fish and Game California Coastal Salmonid Restoration Monitoring and Evaluation Program's Interim Restoration Effectiveness and Validation Monitoring Protocols (2003), and the vegetation monitoring being implemented as part of the Plan for Monitoring the Effects of Releasing the Saltcedar Leafbeetle, *Diorhabda elongata*, for Biological Control of Saltcedar: *D. elongata,* Vegetation, and Wildlife Research Phase, Stage B, as prepared by the Insect, Vegetation and Wildlife Subcommittees of the Saltcedar Consortium (Eberts, et.al., 2000).

Protocol documentation will be developed to instruct the partners in techniques for repeatable quantitative evaluation of the plant community and comparable data collection across partners. Second, the project will overcome technical and motivational difficulties with data collection and management through 1) the adoption and deployment of an existing intuitive data management system called Weed Information Management System (WIMS) that assists weed managers in day-to-day project management and weed eradication planning, and 2) intensive support of the partners in the use of WIMS for their monitoring efforts and every stage of data collection, management, and reporting. Finally, the TAdN Data Coordinator will combine, quality check, and analyze the data, and evaluate and share the results after each monitoring season to allow for adaptive management changes to practices, the protocol, and the WIMS data management system.

As with all TAdN activities, these steps will be conducted within the context of the collaboration, and new appropriate collaborators will be sought to assist in certain steps in which additional expertise or inter-organizational collaboration are needed. These steps are: 1) the development of the monitoring protocol, the development of the data management system components needed to implement the monitoring protocol, training of the monitoring protocol users, the analysis of the data, and the sharing of the data. Protocol and supporting software development will be done within the WIMS Development Team and training workshops will be open to constituents of these agencies and other interested weed managers. The resulting protocol will likely be implemented by the Arundo Biocontrol Program funded by USFWS and conducted by the UC Santa Barbara Marine Science Institute, to begin Marh-July 2005. The process of data collection will be adaptively managed to provide for refinements in the data management software and monitoring protocol in response to partner feedback. Data quality checks will be done close to the time of data collection to allow for correction of problems. These tasks will address the project's two other hypotheses: 1) Partnership with resource agencies and organizations to codevelop a vegetation monitoring system will result in a superior monitoring system and lead to broader adoption and use, and 2) Improved data management system and increased technical support will result in more consistently collected and higher quality data.

Following is a list of the steps to be undertaken and the performance measures used.

Initiation

?? Expand the TAdN Steering Committee to include experts in riparian plant community monitoring.

Development

?? Develop improved monitoring protocol that includes indicators of restoration success, with input from the TAdN Steering Committee.

?? Work within the Weed Information Management System (WIMS) Development Partnership to modify the WIMS database application to allow collection and management of the new monitoring data.
?? Develop supporting documentation for the protocol and data collection system.
?? Test the new protocol and data collection system in the field at selected eradication sites.
?? Performance measures: Protocol and documentation are well understood by testing partners, and the data collection system performs well in the field. Mock datasets simulating change in plant communities over time provide acceptable results toward evaluation of Hypothesis #3.

Implementation
?? Provide partners new protocols, database, and equipment.
?? Train partners in three-day training workshops.
?? Implement monitoring at partner eradication sites.
?? Support partner monitoring and data management through individual assistance and an on-line help desk.
?? Conduct data collation, quality checks, and interim analysis.
?? Performance measures: Analyze partner feedback and quality of data created to rate the level to which partners are succeeding in implementing monitoring using the provided tools.

Adaptive management
?? Get feedback from partners on protocol and data management system.
?? Provide feedback to WIMS Database Development Team to evaluate and formulate recommendations for improvements to data management system.
?? Identify priorities and get approval from TAdN Steering Committee.
?? Make needed improvements to data management system.
?? Deploy next version of WIMS data management system and update partner databases.
?? Performance measures: Feedback from partners is utilized in the decision-making process to improve the data management system. Improvement to data management system results in easier/more reliable data collection and/or higher quality data.

This approach will increase the amount and quality of information collected during and after invasive plant eradication by addressing technical and pragmatic issues that have been problematic in past projects. The multi-organizational development, approval, and adoption of the monitoring protocol and the resulting high-quality software and support will increase confidence in the method and value of expending the extra effort of doing the monitoring, as well as eliminate problems associated with difficult or ambiguous data collection methods. The information will be useful to the individual project managers in their own day-to-day work and their ability to obtain funding from other sources to continue the work by allowing them to track costs of eradication, acres treated and eradicated, use of volunteer time, public and private land access, and effectiveness of methods. The use of the WIMS system, with its ability to interact with GIS and handheld computers, addresses many requests and criticisms partners had of the former Arundo Survey Database, and the addition of monitoring capabilities within this environment will make the monitoring step a natural extension of the data management process. The growing adoption of WIMS by other weed management programs means that there are more programs with which they can exchange information and compare results. The work proposed herein to improve WIMS will be useful to the other programs already using WIMS, including The Nature Conservancy, USFWS Natural Reserve System, and the California Weed Management Areas (please see letters of support from these agencies). These factors will make the data system more relevant to CBDA-funded partners, and so they will be more motivated to learn it and make it part of their operations. This is necessary for successful flow of monitoring data from the local level to the regional and state level.

At the regional scale the additional information becomes instrumental in the evaluation of region-wide progress and effectiveness of restoration methods in various scenarios across watersheds. Evaluated

together with the results of the scientific investigation funded under the Arundo Program's Phase 2 award, a wealth of new information will be made available to guide future efforts of Arundo and other weed eradication projects. This information will include effectiveness of methods under a range of conditions and plant community changes in the context of active revegetation as opposed to natural plant dispersal.

A5. FEASIBILITY

The proposed monitoring and evaluation work is feasible and timely for a number of reasons. First, there is current support from several agencies and organizations to adapt, improve, and implement an advanced weed management system. Feedback we have received at TAdN Steering Committee Meetings, from staff at the Arundo Program's ten partner projects, and from communications with other land managers and restorationists has clearly indicated the need for an improved weed management system that also offers resource management tools. Since the protocol and WIMS Database Development Team has already been assembled, the needed improvements and implementation can be completed in the time allotted. Programmatic permitting/environmental compliance, funded in Phase 2, is scheduled to be completed in advance of the proposed project implementation. Natural and operational conditions are not anticipated to present any delays to project implementation.

The timing of currently funded projects may affect the start date of the proposed monitoring task. The proposed start date for the two years of additional monitoring may not coincide with the end date of the currently funded project. It may therefore be necessary to amend the actual start date to accommodate the needs of project partners. However, many components of the new monitoring system, including the new protocols, improved database, and equipment, can be adopted at any time. In addition, current project partners either own or have acquired access to restoration sites and currently have regulatory permission to do weed control and revegetation on those sites. We do not anticipate any opposition or third-party impacts resulting from this proposed project due to proposed monitoring being done on land with current access agreements. Phase 2 partners will develop access agreements on all land containing Arundo that they wish to treat as part of the Eradication Planning process, which is the first step of their project, and so it is anticipated that the monitoring described in this proposal will be feasible at those sites. Property owners potentially involved in this regional project are too numerous to list. However, current partners are watershed-based organizations and agencies actively engaged with local property owners and groups. Opposition to date has been isolated to a few individual property owners, who generally join the program once they see progress on neighboring properties

Several organizations support this proposal to improve the weed monitoring protocols and WIMS database, including CDFA, USFWS, ICE, SEC, and TNC. The only concern some organizations have voiced is whether the task of monitoring will become unwieldy if too many additional parameters are added to an already complex database. The apparent challenge is to provide a monitoring system that yields enough data to indicate restoration success, yet does not overwhelm the user or discourage use.

VI. EXPECTED PRODUCTS AND OUTCOMES

The products and outcomes of this proposed project are summarized below.

?? Coordination with other invasive species programs, including outreach to appropriate sectors of community.
?? Restoration success monitoring protocol that can be implemented by eradication partners.
?? Software development team communications and meetings.

New version of WIMS with simpler user interface design, with the ability to monitor for restoration success and collect additional information relevant to project management.

?? Curriculum and user support materials.
?? Two 2-3 day workshops in two locations convenient to all partners.
?? Partners provided individual assistance with equipment configuration, data collection, data management, and reporting.
?? Online help desk with FAQs and other support materials for WIMS database users.
?? Weed eradication partners trained, equipped, and motivated to carry out data collection of higher-quality data.
?? Monitoring data collected by partners, assembled in partner databases and in the TAdN master database, and served online on the TAdN map server.
?? Evaluation of trends in vegetation changes within and across partner eradication sites, and their correlation with treatment methods and restoration practices. Testing of hypotheses, and reporting of interim and final results to partners, TAdN Steering Committee, and funder.

VII. DATA HANDLING, STORAGE, AND DISSEMINATION

Data Collection
This proposed project focuses on developing, teaching, and supporting good practices in data collection and handling as a means by which to succeed in the monitoring of restoration actions. The WIMS application, as it has been developed to date by The Nature Conservancy and tested by USFWS, is a strong platform on which to build the monitoring data management system while solving many basic problems of field data collection. The use of handheld computers (PDAs) together with ArcPad GIS and the WIMS data entry forms in the field makes data collection fast and consistent, and eliminates the need to do tedious and error-prone data entry after the field day.

Local Data Management
After collection in the field, data is downloaded to the desktop computer into the WIMS MS Access database, where an array of reports and queries are available to the weed manager for use in project management. The WIMS application includes outputs of weed occurrence, assessment, treatment, and, after the modifications by this project, monitoring data to shapefiles, allowing for integration into GIS. Data will be exported by the weed manager and sent to Sonoma Ecology Center for inclusion in the TAdN data clearinghouse. Exports will correspond with the completion of field data collection to allow for quality checks to be done in a manner timely for correction of any problems.

Regional Clearinghouse
WIMS is already equipped with data export and import functionality, making the creation and update of a regional clearinghouse from many partner databases possible. The resulting regional dataset will be managed at Sonoma Ecology Center by the TAdN Data Coordinator and analyzed with guidance from the Science Advisors. Results will be shared in a manner timely for performance evaluation and adaptive decision-making. The regional dataset will be made available to the partners and the public through the Arundo map server funded in previous CBDA projects. The map server will allow users to view, query, and download the data for their own use. Partners will be able to link to their project-specific data from their own websites. Sensitive information, such as landowner names and contact information, will not be posted.

Statewide/Public Coordination and Sharing
Weed occurrence and treatment data and associated monitoring data will be integrated with the Bay/Delta and Tributaries (BDAT) Program by providing reports for inclusion in the BDAT database. During the development of the monitoring data fields and their allowed attributes, BDAT will be consulted for compliance with standards that will facilitate integration with other Bay-Delta data. Metadata will be entered into the Team Arundo del Norte Catalog in the California Environmental Information Catalog housed at CERES. Weed occurrence data will be contributed to the California Invasive Plant Council's State-wide mapping project, along with the extensive Bay-Delta Arundo distribution dataset being developed under the second phase of funding for the Arundo Eradication and Coordination Program. These contributions will greatly enhance the current understanding of the distribution of *Arundo donax* in California.

VIII. PUBLIC INVOLVEMENT AND OUTREACH

The Arundo Eradication and Coordination Program will continue public outreach through dissemination of our educational materials, comprehensive website information, public presentations, and representation at conferences. Our four Arundo related educational products continue to be very popular for organizational outreach throughout the west coast. The brochure has been revised and is now in its third printing. These materials are reaching a broad audience and we believe contributing to increased awareness of the threats posed by this invasive weed.

The Arundo Program continues to maintain a comprehensive bibliography of Arundo related research and an archive of ongoing discussions from our listserv. The next phase of work will exploit the full potential of web-based interaction with the activation of a map server linking Arundo eradication projects throughout the region.

Project coordinators will continue to make themselves available for presentations at conferences and to present project reports. Individual partners will continue to publicize their achievements through their local news media. Coordinators will also be available for project partner site tours and local meetings. Conference attendance and site visit frequency is outlined in "Tasks and Deliverables."

Database training and educational materials, produced by the new monitoring system development team, will be distributed by TAdN and posted on the TAdN website. Monitoring results will also be posted on the website and disseminated upon request. Letters will be mailed to Weed Management Areas and County Ag commissioners to inform them of project monitoring activities, offer them education materials, and request support for Arundo and other wildland weed eradication in their region.

IX. WORK SCHEDULE

The work schedule for the project's tasks and deliverables is presented in the table below. Monitoring tasks are dependent upon protocol development and software modifications. Additional updates to the software based on user feedback are an independent task in case wherein the updates are cosmetic or non-critical functionality. Map server data posting and management is a task independent of other data management and reporting tasks.

Project Tasks	Duration	Annual time line: Quarte											

		rs											
		1	2	3	4	5	6	7	8	9	10	11	12
Initiation													
? Expand the TAdN Steering Committee to include experts in riparian plant community monitoring.?	1 month												
Development													
? Develop improved monitoring protocol that includes indicators of restoration success, with input from the TAdN Steering Committee.?	2- 3 months												
? Work within the Weed Information Management System (WIMS) Development Partnership to modify the WIMS database application to allow collection and management of the new monitoring data.?	2-4 months												
? Develop supporting documentation for the protocol and data collection system.?	1 month												
? Test the new protocol and data collection system in the field at selected eradication sites.?	1 month												
Implementation													
? Provide partners new protocols, database, and equipment.?	1 month												
? Train partners in three-day training workshops.?	1 month, first and second year												
? Implement monitoring at partner eradication sites.?	30 months												
? Support partner monitoring and data management through individual assistance and an on-line help desk.?	30 months												
? Conduct data collation, quality checks, and interim analysis.?	3 months each year												

Adaptive management													
? Get feedback from partners on protocol and data management system.?	ongoing												
? Provide feedback to WIMS Database Development Team to evaluate and formulate recommendations for improvements to data management system.?	onging												
? Identify priorities and get approval from TAdN Steering Committee.?	ongoing												
? Make needed improvements to data management system.?	2 months each year												
? Deploy next version of WIMS data management system and update partner databases.?	1 month each year												
Reporting and Data Sharing													
? Share and integrate data with other Bay-delta databases, including BDAT?	1 month each year												
? Post monitoring data to the Arundo Map Server?	1 month each year												

B. APPLICABILITY TO CBDA ERP GOALS, ERP DRAFT STAGE 1 IMPLEMENTATION PLAN, AND CVPIA PRIORITIES

1. ERP AND CVPIA PRIORITIES

This program directly addresses goals set forth by the CBDA NIS Strategic Plan and the ERP.

The program addresses Goal5 of the Ecosystem Restoration Program to "reduce negative biological and economical impacts of established non-native species," which is a BR-3 Bay Area priority and MR-1 multi-regional priority of this PSP. Relevant objectives include Objective 6 to "halt the introduction of invasive aquatic and terrestrial plants into Central California" and Objective 7 to "focus control efforts on those introduced species for which control is most feasible and of greatest benefit." The program addresses ERP priorities by improving and increasing aquatic and terrestrial habitats and ecological functions in the CBDA region. The program supports sustainable populations of diverse and valuable plant and animal species by removing a highly invasive plant that displaces these species. Removal of Arundo from stream channels prevents impediments and erosion that disrupt stream flow, cause flooding, and destabilize stream banks. Program objectives correspond with Goals I, II, and III of the NIS Plan to prevent and control the spread of NIS through appropriate management, and reduce their negative ecological and economic impacts. This program addresses the issues (NIS Plan) of leadership,

authority and organization; coordination, cooperation, and partnership; and education and outreach by providing the following:

?? A base of expertise and a conduit for information exchange.
?? A single entity for coordination of Arundo eradication projects.
?? Guidance for the best methods of project implementation and monitoring.
?? Continued support of several projects in critical stream locations that would otherwise not monitor projects at the level desired.
?? Feeding new information from on-the-ground eradication, monitoring, and restoration into a shared information pool.

Below is a list of populations of diverse and valuable plant and animal species for Phase 2 partners.

Phase II Eradication Partners

Stream	**Ecological Manage-ment Unit**	**Species in Multi-Species Conservation Strategy** (partial list)
Upper Cache Creek*	Flows into 10.1	Northern Spotted Owl critical habitat, CA Red Legged Frog, Foothill Yellow Legged Frog, Central CA Coast ESU Steelhead, CA Freshwater Shrimp, Valley Elderberry Longhorn Beetle, 22 more
Lower American River	9.2	Fall-Run Chinook, Central Valley ESU Steelhead, Valley Elderberry Longhorn Beetle, Western Pond Turtle, Sacramento Splittail, Northern CA Black Walnut
Lindo Channel	7.3, 7.4	Valley Elderberry Longhorn Beetle, Spring Run Chinook, Central Valley ESU Steelhead, Western Pond Turtle
San Joaquin River	12.4	San Joaquin Kit Fox, Bald Eagle, Valley Elderberry Longhorn Beetle, Swainson's Hawk, Yellow-Billed Cuckoo, White-Tailed Kite, CA Tiger Salamander, Western Pond Turtle, rookeries of Great Blue Heron and Great Egret
Gray Lodge Wildlife Area	3.3, 7.7	Valley Elderberry Longhorn Beetle, CA Clapper Rail, Swainson's Hawk, Riparian Brush Rabbit, Greater Sandhill Crane, Giant Garter Snake, Western Least Bittern, CA Tiger Salamander

* Site is an Arundo source upstream of major restoration efforts

2. RELATIONSHIP TO OTHER ECOSYSTEM RESTORATION ACTIONS, MONITORING PROGRAMS, OR SYSTEMWIDE ECOSYSTEM BENEFITS

The Team Arundo del Norte (TAdN) Arundo Eradication and Coordination Program (ACEP) employs a regional coordinated approach to NIS eradication efforts Phase 2 of the program expands the number of participating partner projects using the TAdN surveying and monitoring protocols from 5 to 10. This means that all projects will be using the same, proven treatment methods, outreach techniques, and standardized survey and monitoring protocol.

This proposed monitoring and evaluation program significantly expands ties between TAdN and other agencies and organizations involved with ecosystem restoration work. TAdN will be collaborating with an existing weed mapping effort by The Nature Conservancy and its Weed Information Management System, or WIMS, project. This partnership is being joined by others, including the California

Department of Food and Agriculture (CDFA), the California Weed Management Areas (CWMA), the US Fish and Wildlife Service's Reserve System (USFWS), the Information Center for the Environment (ICE), and the Sonoma Ecology Center (SEC). The work among all of these groups—to further improve this weed mapping database and to use the same well-designed data system—will result in increased coordination throughout the CBDA region by making possible the exchange of data that measures the success of invasive weed eradication and native habitat restoration efforts. By sharing resources, it will also consolidate technical support for all participating groups.

TAdN already cooperates with CDFA and its Weed Management Area (WMA) members Collaborating with the WMA program provides TAdN a broader NIS and multi-region context. The Program remains closely linked to the California Invasive Plant Council (Cal-IPC), the California Native Plant Society, and the agencies and academic institutions represented by the diverse members of the TAdN Steering Committee. (See Qualifications, Section C.) The UC Davis Information Center for the Environment (ICE) continues to provide technology and database services for our program.

C. QUALIFICATIONS

ORGANIZATIONAL STRUCTURE AND RESOURCES

The Arundo Eradication and Coordination Program is managed by **Sonoma Ecology Center** staff located at the Sonoma Valley Watershed Station in Eldridge, CA. The **Coordination Team** consists of Program Manager Mark Newhouser, Data Coordinator Deanne DiPietro, and Information Coordinator Bob Hass. This team carries out the central coordination work and communicates on all aspects of the program with the Eradication Partners in their locations in ten different watersheds. The proposed project would provide funds to help continue these positions for the extended time period required to assist the partners in the collection and management of monitoring data, and to consolidate, analyze, and report the data.

The Information Center for the Environment (ICE) at UC Davis will be contracted to continue to assist in areas of database application development, user training, and data systems integration. ICE partners Drs. Jim Quinn and Josh Viers are skilled in data analysis for ecosystem evaluation and assessment, and will be available to advise at all stages of the program. ICE partner Marat Gubaydullin has been the database programmer for the Program and is familiar with the technological needs of the Program.

The **Team Arundo del Norte** (TAdN) Steering Committee (see Appendix A) will continue to guide and advise the Program through its quarterly meetings. Steering committee members are experienced weed managers and invasive species scientists. TAdN was formed to coordinate across organizations and jurisdictions on all matters concerning the control of the noxious weed *Arundo donax*. It also disseminates new scientific research and best management practices and promotes the sharing of information through its website and listserv.

Other Scientific Advisors include Dr. David Spencer of USDA-Agricultural Research Service, Weed Science Unit, UC Davis, and Dr. Tom Dudley, Research Faculty, University of Nevada, Reno.

Because the planned data management system development will also affect other organizations using the Weed Information Management System (WIMS), **a Multi-Organizational Database Team** has been formed to assist with its design and implementation. and to assure that it is useful to all. This team

consists of programmers from The Nature Conservancy, California Department of Food and Agriculture, ICE, TAdN , and others.

Monitoring of restoration actions will be done by the **Eradication Partners** at eradication sites in their respective watersheds, in some cases with on-site support from the Program Coordination Team. Periodic uploads of their data, as well as reports on monitoring activities, will be required from the Partners by the Program Manager two to three times per year. Data and reports will then be reviewed and consolidated by the Coordination Team at Sonoma Ecology Center and included in quarterly reports to the funder. Scientific advisors will be involved in data analysis, and interpretation and presentation of results.

PROGRAM ADMINISTRATION

Program Administrator: Richard Dale, Executive Director, Sonoma Ecology Center. B.A., Environmental Studies, University of California, Santa Cruz., 1982. Sonoma Valley Vintners and Growers Alliance (1999–2003); Sonoma County Vision (2001–2003); Sonoma County Grading Ordinance Working Group (present). John Muir Conservation Award, 1997.

Roles/Responsibilities: Mr. Dale will provide fiscal oversight to the project.

Relevant Experience and Contributions: Mr. Dale has administered over $5 million in grant projects, including 10 years experience coordinating local Arundo eradication efforts. It was the SEC's earliest Arundo project that led to the formation of Team Arundo del Norte, when SEC held a workshop to educate Northern California land managers on the ecological hazards of *Arundo donax* invasion. SEC is known for its watershed research, salmonid restoration, vegetation management/habitat restoration, stakeholder problem-solving, and environmental education.

Program Coordinator: Mark Newhouser, Project Director, Vegetation Management, Sonoma Ecology Center. B.A., Environmental Studies, Conservation and Restoration, Sonoma State University. Board member, California Invasive Plant Council. Team Arundo del Norte Steering Committee Chair.

Roles/Responsibilities: Mr. Newhouser will continue to administer the program, with responsibility for managing its 10 partner projects; preparing quarterly reports, budgets, and partner contracts; facilitating TAdN Steering Committee meetings; acting as liaison with other organizations; and making public presentations.

Relevant Experience and Contributions: Mr. Newhouser has 20 years experience with community project planning and coordination, environmentaleducation and outreach, and volunteer coordination. For the past seven years he has coordinated Arundo eradication efforts in the Sonoma Valley watershed, and since April 2001 has coordinated TAdN's Arundo Eradication and Coordination Program. Specific accomplishments include Arundo Program conceptual development and implementation; development of eradication plan guidelines and partner subcontract; and adaptive strategies for working with private landowners and dealing with access issues, regulatory requirements, water quality considerations, and revegetation needs. Mr. Newhouser is a founding member of TAdN and has facilitated a broad coalition of representatives from government agencies, academic institutions, non-profits and private landowners in the development of the Arundo Eradication Program.

He has coauthored a number of invasive weed publications, including *Controlling Arundo in Your Watershed: A Guide for Organizations* (2000), and *Arundo: A Landowner Handbook* (publication and video, 2000).

Data Management Coordinator: Deanne DiPietro, GIS and Information Services Manager, Sonoma Ecology Center. B.S., Botany, University of California, Davis, 1984. M.A., Geography; UC Davis, 2002. Thesis: *Mapping the invasive plant Arundo donax and associated riparian vegetation using hyperspectral remote sensing.* Board member and Weed Mapping Committee Chair, California Invasive Plant Council.

Roles/Responsibilities: Ms. DiPietro will coordinate all aspects of the program's data management needs, including modifications to the currently used Weed Information Management System, training and user support, and data clearinghouse management.

Relevant Experience and Contributions: Ms. DiPietro has 10 years experience in environmental data management and information technology solutions. She has been involved in Team Arundo del Norte from the onset as a founding member, webmaster, and listserv manager. She will continue in her role as data coordinator for the second phase of the Arundo Eradication and Coordination Program. At the California Resources Agency's CERES Program and the UC Davis Information Center for the Environment, Ms. DiPietro has led the development of data management systems intended for multiple users with the goal of consolidating and integrating the data at the regional scale. Contributions include the development of the original Arundo Surveying Database, database user training and support, the TAdN Website and Arundo Digital Library, and the Arundo Map Server. In her role as GIS/Information Services Manager for Sonoma Ecology Center, she works closely with regional and national partners in the digital library and geographic information systems community. Relevant publications include the California Weed Mapping Handbook (Schoenig, Johnson, DiPietro, Kelly, Yacoub, and Gendron; 2002), and several works on remote sensing of invasive plants using hyperspectral data analysis

Science Advisor: Dr. Jim Quinn, Professor of Environmental Science and Policy, University of California, Davis; Co-director of the Information Center for the Environment ; Leader of the California Information Node (CAIN) of the National Biological Information Infrastructure. Ph.D., Zoology, University of Washington, 1979; B.A., Biology, Harvard University.

Roles/Responsibilities: Dr. Quinn will advise TAdN in areas of monitoring protocol design, data model design for interoperability, and on appropriate organizations with which to consult or seek partnership. Dr. Quinn also works with the CBDA-funded Lepidium Eradication Program, and will assist with connectivity between these two invasive weed programs.

Relevant Experience and Contributions: Current research interests include environmental applications of Semantic Web technologies, the use of geospatial information systems to assess biodiversity, land use and water quality, international databases and information sharing on invasive species and species in protected areas, watershed and floodplain analysis, and the dynamics and restoration of the San Francisco Bay–Sacramento Delta ecosystem. Past research programs also include work on marine intertidal communities, Pacific Coast marine fisheries, marine protected areas, and conservation biology as applied to parks and nature preserves.

Science Advisor: Joshua H. Viers, Assistant Research Ecologist, Information Center for the Environment, UC Davis. Ph.D., Ecology, UC Davis, 2003. He has published on a variety of subjects, including watershed analysis methods, serpentine endemic plant distributions, riparian vegetation

restoration and salmon conservation, land use and river geomorphology, invasive fishes, and most recently alien plants and extinction risk in California flora.

Roles and Responsibilities: Dr. Viers will provide guidance in the areas of data analysis and interpretation.

Relevant Experience and Contributions: Dr. Viers has extensive experience in the design, development, and use of spatial data systems for natural resource management. His experience with data collection on two riparian invasives, perennial pepperweed (*Lepidium latifolium*) and Himalayan blackberry (*Rubus discolor*), will provide meaningful feedback on the proposed data management model. His current research focuses on predictive modeling for resource management. These efforts encompass non-native invasive species, the spatial effects of land use activities on riparian and aquatic habitat heterogeneity, and the integration of high-spatial resolution, hyperspectral data into resource inventories.

Qualifications

D. COST

D1. BUDGET

All tasks of this proposal are fully integrated, so implementation of portions is not feasible.

D2. COST-SHARING

All promised and proposed cost-share is offered as in-kind services to be provided by partnering organizations. The following table includes cost-share commitments for this proposal:

Donor	**Deliverable**	**Cost-Share**
Science Advisors	Consultation time and meetings	9,000
TNC, CDFA, and USFWS	Staff time for meetings	17,280
TNC	Data manager	6,000
TNC	WIMS database	150,000
USFWS, TNC	WIMS training curriculum	30,000
USFWS, TNC	Training room and equipment	11,640
WIMS Database Development Team	Input and support	15,000
SEC GIS Lab	System Admin. and equipment	80,000
	TOTAL:	**318,920**

D3. LONG-TERM FUNDING STRATEGY

Restoration success monitoring is anticipated to be a long-term proposition, requiring several more years to ensure successful revegetation of current sites. TAdN strategy for funding further expansion of the TAdN Arundo Eradication Program and ongoing restoration monitoring funding is to diversify funding sources from both public and private sources. TAdN plans to continue to expand partnerships with

federal and state agencies, attracting resources and potential funding. We will also continue to request funding from CALFED/CBDA for continuation and expansion of our program.

E. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The applicant agrees to comply with all standard State and Federal contract terms.

G. LITERATURE CITED AND SUPPORTING RESEARCH

Agricultural Research, April 2001. Article and photos describing researchers' (UC Berkeley ecologist Thomas L. Dudley, ARS entomologists Raymond I. Carruthers and Alan A. Kirk, and ARS plant pathologist Timothy L. Widmer) search in Nepal for biological control agents for *Arundo donax*, tamarisk, and salt cedar. http://www.ars.usda.gov/is/AR/archive/apr01/path0401.htm

Baxter, R. 2004. Current status of Arundo removal by Riverside County Parks. Riverside County Regional Park & Open Space District, Riverside, CA. Personal communication.

Begon, M., J. Harper, and C. Townsend. 1995. *Ecology*. 2nd ed. Blackwell Publishing, Cambridge, UK. pp. 792–793, 812.

Bell, Gary P. 1997. Ecology and management of *Arundo donax*, and approaches to riparian habitat restoration in Southern California.

Boose, A. B. and Holt, J. S., 1999. Environmental effects on asexual reproduction in Arundo donax. *Weed Research* 39:2, pp. 117-127.

Brower, J. E., J. H. Zar, and C. N. von Ende. 1998. *Field and laboratory methods for general ecology* (4th ed.). McGraw Hill, Boston. 273 pp.

Cal-IPC Pest Plants of Greatest Ecological Concern, http://www.cal-ipc.org/

California Environmental Resources Information System (CERES) site on invasive species. http://www.ceres.ca.gov/theme/invasives.html

California Department of Food & Agriculture. *California,* September 2002 (draft).

D'Antonio CM, Dudley TL, Mack M., 2000. Disturbance and biological invasions: Direct effects and feedbacks. Pages 429-468 in Walker LR, ed. Ecosystems of Disturbed Ground. Ecosystems of the World. Vol. 16. New York: Elsevier Science.

Decruyenaere, J. G. and J. S. Holt. 2001. Seasonality of clonal propagation in giant reed. *Weed Science* 49: 760–767.

Douce, R. The Biological Pollution of *Arundo donax* in River Estuaries and Beaches. In *Arundo donax* Workshop Proceedings. Jackson, N. E., Frandsen, P., Douthit, S., eds., Ontario, CA, November, 1993.

Dudley, T. and B. Collins. 1995. Biological invasions in California wetlands: the impacts and control of non-indigenous species in natural areas. Pacific Institute for SIDES, Oakland, CA.

Eberts, D., Kazmer, D, Thompson, D., Lewis, P., DeLoach, J., Carruthers, R., Knutson, A., Dudley, T., Tracey, J., Abbot, G., and Adams, G. 2000. Plan for Monitoring the Effects of Releasing the Saltcedar Leafbeetle, *Diorhabda elongata*, for Biological Control of Saltcedar: *D. elongata,* Vegetation, and Wildlife Research Phase, Stage B. http://wric.ucdavis.edu/exotic/techtran/years2-3.htm.

Elmore, C. L., J. L. Stapleton, C. E. Bell, and J. E. DeVay. 1997. Soil solarization a nonpesticidal method for controlling diseases, nematodes, and weeds. University of California DANR, Oakland. 13 pp.

Else, J. 1996. Post-Flood Establishment of Native Woody Species and an Exotic, Arundo donax, in a Southern California Riparian System. Master's thesis. San Diego State University, San Diego.

Frandsen, P. R., 1997. Team Arundo: Interagency cooperation to control giant cane (*Arundo donax*). Pp. 244-248 in: Luken, J. O. Thieret, J. W., eds. Assessment and Management of Plant Invasions, New York: Springer.

Franklin, B. B. 1996. Eradication/control of the exotic pest plants tamarisk and Arundo in the Santa Ynez River drainage. USDA-FS-PSW, no number.

Gaffney, K.A. 200. Invasive plants in riparian corridors: Distribution, control methods, and plant community effects. MA Thesis. Sonoma State University.

Gianquinto, G., Sambo, P. and Bona, S. 2003. The use of SPAD-502 chlorophyll meter for dynamically optimizing the nitrogen supply in potato crop: a methodological approach. *Acta Hortaculturae* 627:217-224.

Giessow, J. 2004. Successes of Arundo eradication in the San Diego area by his company. Personal communication.

Giessow, J. and J. Giessow. 2001. Planning *Arundo donax* removal: A review of methods for control and biomass removal. In *Proceedings: Cal-EPPC Council Symposium,* Volume 6, ed. M. Kelly. Poster.

Hickman, J. C. (ed.) 1993. *The Jepson Manual.* University of California Press, Berkeley, CA. 1400 pp.

Iverson, Mark E. 1993. Effects of *Arundo donax* on Water Resources. *Arundo donax* Workshop Proceedings. Team Arundo. Riverside, CA.

The Jepson Manual: Higher Plants of California. 1993. J. C. Hickman, ed. University of California Press, Berkeley. 1400 pp.

Lawson, D. and H. Smead. 2001. Evaluation of chipped Arundo biomass as mulch. In *Proceedings: Cal-EPPC Council Symposium,* Volume 6, ed. M. Kelly. Poster.

Leidy, Robert. 1998. Historical Distribution and Current Status of Stream Fishes of the San Francisco Estuary: Opportunities for Protection and Restoration of Native Fish Assemblages. State of the Estuary conference, March 17-19, San Francisco. San Francisco Estuary Project.

Lowrey, J. 2004. Current status of Arundo and *Tamarix* removal by Cache Creek Conservancy and others. Cache Creek Conservancy. Personal communication.

Mitchell, J., J. Giessow, and J. Giessow. 2001. Role of the Santa Margarita and San Luis Rey Watersheds Weed Management Area in watershed-based exotic plant control and restoration in northern San Diego County. In *Proceedings: Cal-EPPC Council Symposium,* Volume 6, ed. M. Kelly. Poster.

Myers, J.H. and D.R. Bazely. 2003. Ecology and Control of Introduced Plants. Cambridge University Press, Cambridge, UK. pp. 79–88.

National Weed Strategy for Invasive Plant Management, Federal Interagency Committee for the Management of Noxious and Exotic Weeds. April 1998.

Neill, B. and J. Giessow. 2001. Distributions of *Arundo donax* in coastal watersheds of Southern California. In *Proceedings: Cal-EPPC Council Symposium,* Volume 6, ed. M. Kelly. Poster.

Pitlow, R. H. and F. H. Dawson. 1993. Flow-resistance of aquatic weeds. In *Aquatic Weeds: The Ecology and Management of Nuisance Aquatic Vegetation,* Pieterse, A. H. and K.J. Murphy (eds). Oxford University Press, Oxford, England, pp. 74–84.

SAS Institute, Inc. 1999. SAS/STAT User's Guide, Version 8. SAS Institute, Inc., Cary, NC. 3884 pp.

Sonoma Ecology Center and Media Services, California State University, Sacramento. 1999. Controlling Arundo in Your Watershed: A Guide for Organizations. California Department of Fish and Game.

Sonoma Ecology Center and Media Services, California State University, Sacramento. 1999. Arundo: A Landowner Handbook. California Department of Fish and Game.

Trumbo, J. 1998. Comparison of three methods of glyphosate application and their effects in the control of *Arundo donax.* Calif. Dept. of Fish and Game, Sacramento.

Rieger, J.P. and D.A. Kreager. 1989. Giant reed (*Arundo donax*): A climax community of the riparian zone. In *Protection, management, and restoration for the 1990s: Proceedings of the California Riparian Systems Conference, September 22–24, 1988, Davis, CA. General* Technical Report PSW-

110. USDA Forest Service, Berkeley, CA. pp. 222–225.
Wetzel, R. G. and G. E. Likens. 1991. *Limnological Analysis* (2nd Edition). Springer-Verlag, New York. 391 pp.
Wijte, A.H.B.M. 1998. The role of tissue nitrogen content on *Arundo donax* translocation rates and rhizome growth. In *Proceedings of the Arundo and Salt Cedar Workshop: The Deadly Duo.*
Zembal, R. and S. Hoffman. 2000. *Environmental Assessment of the Santa Ana Watershed Program.* Fountain Valley, CA.

H. NONPROFIT VERIFICATION

IRS letter verifying nonprofit status is appended to the end of this proposal.

Appendix A. Team Arundo del Norte Steering Committee.

Caitlin Cornwall, M.S., Plant Biology, Arizona State University, Tempe, AZ.
Tom Dudley, Ph.D. University of Nevada, Reno. Board member, Cal-IPC.
Karen Gaffney, Restoration Projects Manager, Circuit Rider Productions, Inc., Windsor, CA.
Jason Giessow, Santa Margarita and San Luis Rey Watersheds Weed Management Area and DENDRA Inc., Encinitas, CA. Member, Cal-IPC Board of Directors.
Jessie Giessow, Santa Margarita and San Luis Rey Watersheds Weed Management Area and DENDRA Inc., Encinitas, CA.
Richard G Holman, Computer Science and Technology, College of Engineering, California State University, Chico.
Paul Jones, U.S. Environmental Protection Agency, San Francisco, CA.
Jan Lowrey, Cache Creek Conservancy, Projects Manager, Woodland, CA.
Lia Mclaughlin, Watershed Coordinator, Nonnative Invasive Species Program, USFWS, Stockton, CA.
Robyn Lee Myers, Ph.D., State Landscape Ecologist, Watershed Planning Services, USDA NRCS, UC Davis.
Michael Perrone, California Department of Water Resources, Division of Environmental Services, Sacramento, CA.
Steve Schoenig, Senior Environmental Research Scientist and Invasive Species Coordinator, California Department of Food and Agriculture, Sacramento, CA.
David Spencer, Ph.D., USDA Agricultural Research Service, Exotic and Invasive Weed Research Unit,Weed Science Unit, UC Davis.
Ron Unger, Senior Restoration Ecologist, EDAW, Inc., Sacramento, CA.

Partner Project Members:

Kristin Cooper-Carter (Lindo Channel), College of Engineering, California State University, Chico.
Rob Hill (Grey Lodge Wildlife Area), Butte County Weed Management Area, Butte County Agricultural Commissioner's Office. Butte County, CA.
Valerie Curley (San Joaquin River), United States Bureau of Reclamation, Fresno, CA.
Alex Straessle (Cache Creek), Lake County Department of Public Works, Water Resources Division, Lakeport, CA.
Frank Wallace (American River), Sacramento Weed Warriors, A Project of the California Native Plant Society, Sacramento Valley Chapter, Sacramento, CA.
Pam Romo (Walnut Creek), Contra Costa County, Walnut Creek, CA.
Rich Marovich (Putah Creek), Putah Creek Council, Vacaville, CA.
James Johnson (San Francisquito Creek), San Francisquito Watershed Council, Palo Alto, CA.
Todd Adams (Napa River), Napa County Flood Control & Water Conservation District, Napa, CA.
Tracy Enhelder (Sonoma Creek), Sonoma Ecology Center, Sonoma, CA.

INTERNAL REVENUE SERVICE
DISTRICT DIRECTOR
P. O. BOX 2508
CINCINNATI, OH 45201

DEPARTMENT OF THE TREASURY

Date: DEC 10 1998

Employer Identification Number:
94-3136500
DLN:
17053213751008
Contact Person:
D. A. DOWNING
Contact Telephone Number:
(877) 829-5500
Addendum Applies:
No

LOCAL EARTH ACTION FORUM
PO BOX 342
SONOMA, CA 95476-0342

Dear Applicant:

Based on the information you recently submitted, we have classified your organization as one that is not a private foundation within the meaning of section 509(a) of the Internal Revenue Code because you are described in sections 509(a)(1) and 170(b)(1)(A)(vi).

Your exempt status under section 501(a) of the Internal Revenue Code as an organization described in 501(c)(3) is still in effect.

This classification is based on the assumption that your operations will continue as you have stated. If your sources of support, or your purposes, character, or method of operation change, please let us know so we can consider the effect of the change on your exempt status and foundation status.

This supersedes our letter dated March, 1996.

Grantors and contributors may rely on this determination unless the Internal Revenue Service publishes notice to the contrary. However, if you lose your section 509(a)(1) status, a grantor or contributor may not rely on this determination if he or she was in part responsible for, or was aware of, the act or failure to act, or the substantial or material change on the part of the organization that resulted in your loss of such status, or if he or she acquired knowledge that the Internal Revenue Service had given notice that you would no longer be classified as a section 509(a)(1) organization.

If we have indicated in the heading of this letter that an addendum applies, the addendum enclosed is an integral part of this letter.

Because this letter could help resolve any questions about your private foundation status, you should keep it in your permanent records.

STATE OF CALIFORNIA ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF FOOD AND AGRICULTURE

1220 N Street, Room A-357
Sacramento, CA 95814
Telephone: (916) 654-0768
Facsimile: (916) 653-2403

November 16, 2004

California Bay Delta Authority;

This letter is to express strong support for the Team Arundo del Norte Arundo Eradication and Coordination Program's Proposal for a CBDA ERP Monitoring project.

As Noxious Weed Coordinator for California Department of Food and Agriculture and President of the California Invasive Plant Council (Cal-IPC), I have been working with Team Arundo del Norte on invasive plant mapping solutions. We see the need for improved data management tools, and are collaborating on the development of The Nature Conservancy's Weed Information Management System (WIMS), an application for weed mapping and eradication project data management. CDFA and Cal-IPC are very interested in supporting better invasive species monitoring and data interoperability, and this project will help not only TAdN but other weed management programs as well. Examples of these are watershed groups, Resources Conservation Districts, Weed Management Areas.

I cannot think of another organization that is as technologically well equipped to design monitoring tools that help meet CBDA objectives and at the same time benefit as many diverse weed groups in the CBDA solutions area.

Sincerely,

Steve Schoenig
Senior Environmental Research Scientist
Integrated Pest Control Branch
Plant Health and Pest Prevention Services

The Nature Conservancy
Saving the last great places on Earth

The Nature Conservancy
Invasive Species Initiative
821 SE 14th Avenue
Portland, OR 97214 USA

tel [503] 802.8150
fax [503] 230.9639
e-mail imtu@tnc.org
www http://tncweeds.ucdavis.edu

November 15, 2004

California Bay-Delta Authority Grant Review Board
650 Capitol Mall, 5th Floor
Sacramento, CA 95814

Dear Grant Review Board,

It is my pleasure to send this letter of strong support for Team Arundo del Norte Arundo Eradication and Coordination Program's Proposal for a CBDA ERP Monitoring project grant.

The Nature Conservancy's Invasive Species Initiative and Team Arundo del Norte have formed a partnership to further develop the TNC Weed Information Management System (WIMS), a database application that was created to make weed mapping and eradication project data management practical for the site project managers. Through this partnership, we are working to pool our efforts and expertise towards better invasive species monitoring and data sharing between multiple partners.

Resources are needed to continue refinement of the application, and to offer a staffed help-desk to respond to user feedback and requests for assistance. The Nature Conservancy agrees with the addition of monitoring functionality, based on the advice of a science team, to develop appropriate monitoring protocols to assess condition and changes of condition due to weed management activities. We are thrilled to be working with Team Arundo del Norte to develop WIMS into a widely-used application that will promote good data management and sharing.

The Nature Conservancy strongly supports this proposed project, and is committed to the in-kind contributions stated therein.

Sincerely,

Mandy Tu, Ph.D.
Invasive Species Ecologist
The Nature Conservancy's Invasive Species Initiative

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1211 SE Cardinal Ct,. Ste 100
Vancouver, WA 98683

IN REPLY TO:
NWRS/OPR/Biol

November 17, 2004

California Bay-Delta Authority Grant Review Board
650 Capitol Mall, 5th Floor
Sacramento, CA 95814

Dear Grant Review Board,

I am writing this letter of recommendation on behalf of Team Arundo del Norte. I strongly endorse the proposed project to continue development of The Nature Conservancy's Weed Information Management System (WIMS) for the purposes of mapping, monitoring, and information sharing. We have been working with The Nature Conservancy and the Sonoma Ecology Center to provide WIMS training to partners and hope to expand these important efforts.

This project will make a significant contribution towards the CALFED monitoring program in the area of invasive plant species. The extensive knowledge and experience of Team Arundo del Norte, the Sonoma Ecology Center, and The Nature Conservancy will ensure a valuable, high quality end product.

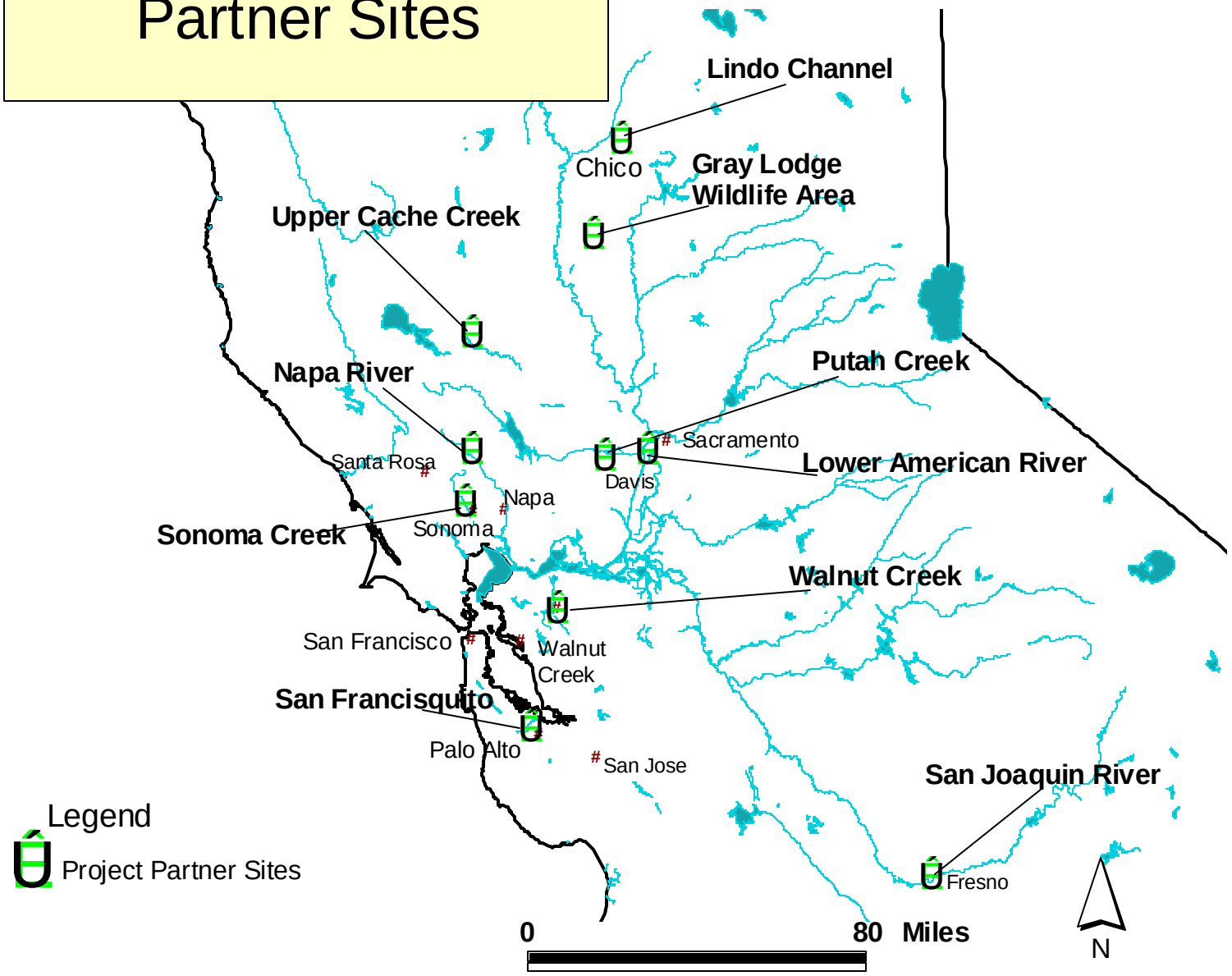
Should you require additional information, please contact me at (360) 604-2558 or email sam_johnson@fws.gov .

Sincerely,

R. Sam Johnson

R. Sam Johnson
Refuge Operations

Arundo Eradication Partner Sites



Tasks And Deliverables

Arundo donax eradication and coordination program: monitoring and evaluation

Task ID	Task Name	Start Month	End Month	Deliverables
11	Project Management	1	36	**Semiannual and final reports. Periodic invoices**
1–10	**Eradication and Restoration Success Monitoring**	**1**	**36**	**Monitoring data collected into partner databases.**
11a	**Program Coordination: Program Management**	**1**	**36**	**Program management and partner contract management; presentations and outreach at appropriate conferences and meetings**
11b	**Program Coordination: Reporting**	**4**	**36**	**Quarterly reports to TAdN Steering Committee of progress, issues needing resolution, findings, and interim analysis results that may lead to adaptive project management changes.**
11c	**Program Coordination: Reporting**	**4**	**36**	**Provide quarterly reports to CBDA of progress, findings, and interim analysis results.**
11d	**Program Coordination**	**36**	**36**	**Provide final report to CBDA.**
12a	**Data Coordination: Data and Technical Project Management**	**1**	**36**	**Data and technical project management. Coordination with other programs handling invasive species daa. Outreach and presentations at appropriate conferences and meetings.**
12b	**Data Coordination:**	**1**	**36**	**Compile partner data into TAdN master database.**

	Data Compilation			**Perform quality checks and work with parnters to mitigate any problems.**
12c	**Data Coordination: Data Analysis**	**1**	**36**	**Evaluate trends in vegetation changes within and across partner eradication sites and their correlation with treatment methods and restoration practices. Test hypotheses 1, 2, 3, and 4. Seek assistance from science advisors in testing hypotheses # 4. Provide feedback to partners on interim findings. Present results of analysis in reports to Steering Committee and CBDA.**
12d	**Data Coordination: Data Sharing**	**13**	**36**	**Post monitoring data to the Arundo Map Server. Update Map Server with additional environmental data layers for partner sites. Integrate data with the BDAT Database.**
12e	**Data Coordination: Computer Systems Administration**	**1**	**36**	**Hardware and software configuration for program communications and online data services.**
13a	**Monitoring System Development: Monitoring Protocol Development**	**1**	**4**	**Coordination with the TAdN Science Committee, Science Advisors, TNC and other monitoring organizations. Develop restoration success monitoring protocol that can be implemented by eradication partners.**
13b	**Monitoring System Development:**	**1**	**36**	**Make improvements and upgrades to the WIMS Data Management System. Hold**

	Data Management System Coordination			three in-person meetings (two in Portland, OR, one in Davis, CA), and nine conference-call meetings with the WIMS Database Management Team to oversee improvements and upgrades to the software. Also use online developers' forum to facilitate the work of multiple programmers and designers while maintaining version control.
13c	Monitoring System Development: Data Management System Development	4	7	Add new elements to WIMS to track changes in plant communities at eradication sites to support monitoring of restoration success. Make changes to tables and corresponding additions to forms interface on both the desktop and the handheld computer. Develop new version of WIMS with upgrades delivered to users.
13d	Monitoring System Development: Data Management System Upgrades	7	36	Make refinements to the WIMS database based on user feedback.
14a	Monitoring Training and Support: Curriculum Preparation	7	36	Develop curriculum and user support materials for training partners in use of the improved monitoring protocol and the new version of the WIMS database. Coordinate all content with the WIMS Development Team.
14b	Monitoring Training and Support:	7	36	Hold two 2-3 day workshops in two locations convenient to all partners to train

	Training			users (and other trainers) in the effective use of the improved monitoring protocol.
14c	Monitoring Training and Support: Equipment Configuration	7	36	Each partner is equipped with monitoring data collection equipment, including a pocket PC computer, GPS unit, and ArcPad license.
14d	Monitoring Training and Support: Technical Support	7	36	Partners more capable and motivated to carry out data collection as a result of receiving individual assistance--at partner sites and by phone--with data collection, management, and reporting. Configure all equipment together with the partners in order to train them in the set-up of these tools.
14e	Monitoring Training and Support: Online help desk	7	36	Online support system that allows users to provide feedback, ask questions, and get help.

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$99,532	$21,899	$13,505	$16,200	$221,788	$0	$0	$8,000	$380,924	$15,428	$396,352

Do you have cost share partners already identified?
Yes.

If yes, list partners and amount contributed by each:

Cost share partners and their contributions are listed in the proposal text, pg. 19, for a total of $318,920.00

Note: Tasks are ordered to match our currently funded project which this proposal will monitor. Subtasks for Task 11 contain all costs for Task 11. Please disregard the top row, Task 11.

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?
No.

Arundo donax eradication and coordination program: monitoring and evaluation

Arundo donax eradication and coordination program: monitoring and evaluation

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
11: project management (12 months)	0	0	0	0	0	0	0	0	$0	0	$0
1−10: Eradication and Restoration Success Monitoring (12 months)	0	0	0	0	28997	0	0	0	$28,997	0	$28,997
11a: Program Coordination: Program Management (12 months)	0	0	684	250	0	0	0	800	$1,734	0	$1,734
11b: Program Coordination: Reporting (9 months)	0	0	0	0	0	0	0	0	$0	0	$0
11c: Program Coordination: Reporting (9 months)	0	0	0	0	0	0	0	0	$0	0	$0
12a: Data Coordination: Data and Technical Project Management (12 months)	0	0	2995	150	0	0	0	800	$3,945	0	$3,945
12b: Data Coordination: Data Compilation	3678	809	0	0	0	0	0	0	$4,487	570	$5,057

(12 months)											
12c: Data Coordination: Data Analysis (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
12e: Data Coordination: Computer Systems Administration (12 months)	**0**	**0**	**0**	**3500**	**10800**	**0**	**0**	**0**	$14,300	**0**	$14,300
13a: Monitoring System Development: Monitoring Protocol Development (4 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
13b: Monitoring System Development: Data Management System Coordination (12 months)	**0**	**0**	**1500**	**600**	**0**	**0**	**0**	**0**	$2,100	**0**	$2,100
13c: Monitoring System Development: Data Management System Development (4 months)	**0**	**0**	**0**	**0**	**14400**	**0**	**0**	**0**	$14,400	**0**	$14,400
13d: Monitoring System Development: Data Management System Upgrades (6 months)	**0**	**0**	**0**	**0**	**4800**	**0**	**0**	**0**	$4,800	**0**	$4,800
14a: Monitoring Training and Support:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0

Curriculum Preparation (6 months)											
14b: Monitoring Training and Support: Training (6 months)	0	0	1080	0	10179	0	0	0	$11,259	0	$11,259
14c: Monitoring Training and Support: Equipment Configuration (6 months)	0	0	0	8500	0	0	0	0	$8,500	0	$8,500
14d: Monitoring Training and Support: Technical Support (6 months)	0	0	0	0	5623	0	0	0	$5,623	0	$5,623
14e: Monitoring Training and Support: Online help desk (6 months)	0	0	0	0	0	0	0	0	$0	0	$0
Totals	**$3,678**	**$809**	**$6,259**	**$13,000**	**$74,799**	**$0**	**$0**	**$1,600**	**$100,145**	**$570**	**$100,715**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
11: project management (12 months)	0	0	0	0	0	0	0	0	$0	0	$0
	0	0	0	0	57970	0	0	0	$57,970	0	$57,970

1−10: Eradication and Restoration Success Monitoring (12 months)											
11a: Program Coordination: Program Management (12 months)	**11800**	**2596**	**900**	**700**	**0**	**0**	**0**	**1600**	$17,596	**1714**	$19,310
11b: Program Coordination: Reporting (12 months)	**1475**	**325**	**0**	**0**	**0**	**0**	**0**	**0**	$1,800	**286**	$2,086
11c: Program Coordination: Reporting (12 months)	**1475**	**325**	**0**	**0**	**0**	**0**	**0**	**0**	$1,800	**286**	$2,086
12a: Data Coordination: Data and Technical Project Management (12 months)	**10325**	**2271**	**1170**	**50**	**0**	**0**	**0**	**1600**	$15,416	**1600**	$17,016
12b: Data Coordination: Data Compilation (12 months)	**2212**	**487**	**0**	**0**	**0**	**0**	**0**	**0**	$2,699	**343**	$3,042
12c: Data Coordination: Data Analysis (12 months)	**2212**	**487**	**0**	**0**	**0**	**0**	**0**	**0**	$2,699	**343**	$3,042
12d: Data	**3678**	**809**	**0**	**0**	**0**	**0**	**0**	**0**	$4,487	**570**	$5,057

Coordination: Data Sharing (12 months)											
12e: Data Coordination: Computer Systems Administration (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
13b: Monitoring System Development: Data Management System Coordination (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
13d: Monitoring System Development: Data Management System Upgrades (12 months)	**0**	**0**	**0**	**0**	**4800**	**0**	**0**	**0**	$4,800	**0**	$4,800
14a: Monitoring Training and Support: Curriculum Preparation (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
14b: Monitoring Training and Support: Training (12 months)	**0**	**0**	**1080**	**0**	**10179**	**0**	**0**	**0**	$11,259	**0**	$11,259
14c: Monitoring Training and Support: Equipment Configuration (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0

14d: Monitoring Training and Support: Technical Support (12 months)	0	0	0	0	5623	0	0	0	$5,623	0	$5,623
14e: Monitoring Training and Support: Online help desk (12 months)	0	0	0	0	0	0	0	0	$0	0	$0
Totals	**$33,177**	**$7,300**	**$3,150**	**$750**	**$78,572**	**$0**	**$0**	**$3,200**	**$126,149**	**$5,142**	**$131,291**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
11: project management (12 months)	0	0	0	0	0	0	0	0	$0	0	$0
1−10: Eradication and Restoration Success Monitoring (12 months)	0	0	0	0	57994	0	0	0	$57,994	0	$57,994
11a: Program Coordination: Program Management (12 months)	23600	5192	1886	1000	0	0	0	1600	$33,278	3658	$36,936
11b: Program Coordination: Reporting (12 months)	1475	325	0	0	0	0	0	0	$1,800	229	$2,029

11c: Program Coordination: Reporting (12 months)	**1475**	**325**	**0**	**0**	**0**	**0**	**0**	**0**	$1,800	**229**	$2,029
11d: Program Coordination (1 month)	**2950**	**649**	**0**	**0**	**0**	**0**	**0**	**0**	$3,599	**457**	$4,056
12a: Data Coordination: Data and Technical Project Management (12 months)	**25075**	**5516**	**2210**	**850**	**0**	**0**	**0**	**1600**	$35,251	**3887**	$39,138
12b: Data Coordination: Data Compilation (12 months)	**2212**	**487**	**0**	**0**	**0**	**0**	**0**	**0**	$2,699	**343**	$3,042
12c: Data Coordination: Data Analysis (12 months)	**2212**	**487**	**0**	**0**	**0**	**0**	**0**	**0**	$2,699	**343**	$3,042
12d: Data Coordination: Data Sharing (12 months)	**3678**	**809**	**0**	**0**	**0**	**0**	**0**	**0**	$4,487	**570**	$5,057
12e: Data Coordination: Computer Systems Administration (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
13b: Monitoring	**0**	**0**	**0**	**600**	**0**	**0**	**0**	**0**	$600	**0**	$600

System Development: Data Management System Coordination (12 months)											
13d: Monitoring System Development: Data Management System Upgrades (12 months)	**0**	**0**	**0**	**0**	**4800**	**0**	**0**	**0**	$4,800	**0**	$4,800
14a: Monitoring Training and Support: Curriculum Preparation (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
14b: Monitoring Training and Support: Training (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
14c: Monitoring Training and Support: Equipment Configuration (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0
14d: Monitoring Training and Support: Technical Support (12 months)	**0**	**0**	**0**	**0**	**5623**	**0**	**0**	**0**	$5,623	**0**	$5,623
14e: Monitoring Training and Support: Online help desk (12 months)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	$0	**0**	$0

Totals	**$62,677**	**$13,790**	**$4,096**	**$2,450**	**$68,417**	**$0**	**$0**	**$3,200**	**$154,630**	**$9,716**	**$164,346**

Budget Justification

Arundo donax eradication and coordination program: monitoring and evaluation

Labor

Project management tasks will be accomplished by program staff, largely by Project Manager. These activities are described in detail in the proposal text. Costs for these tasks are included in task line items, not in a separate program management line.

Project Manager/Task 11– (694 hours per year, 1.5 years), Task 13 – (64 hours per yr, 3 years) 1,041 hours; Data Coordinator/Task 12 – (694 hours per year, 1.5 years), Task 13 – (64 hours per yr, 3 years) 1,041 hours; Geographic Technician/Tasks 12 – (50 hours/year, 2 years), Task14 – (160 hours per year 1, 40 hours per year 2 and 3) 340 hours

Project Manager/Task 11– $36.88/hr; Data Coordinator/Task 12– $36.88/hr; Geographic Technician/Task 12, 14 – $32.45.

Benefits

Project Manager, Data Coordinator, Geographic Technician – Benefits calculated at 22%

Travel

All mileage calculated at $0.36/mile

PrgMgr/ Task 11/Yr1: 10 partner site visits ~ 150 miles; 2 conferences ~ 200 miles; 1 conference airfare, Total: $684 PrgMgr/ Task 11/Yr2: 10 partner site visits ~ 150 miles; 2 conferences ~ 200 miles; 2 partner quarterly meetings ~ 140 miles; 2 agency/CBDA meetings ~ 160 miles; 2 conference registration, airfare, and lodging, Total: $888 PrgMgr/ Task 11/Yr3: 20 partner site visits ~ 150 miles; 4 conferences ~ 200 miles; 8 potential partner visits ~ 200 miles; 4 partner

quarterly meetings ~ 140 miles; 2 agency/CBDA meetings ~ 160 miles; 2 conference registration, airfare, and lodging, Total: $1,702 DataCoord/ Task 12/Yr1: 10 partner site visits ~ 150 miles; 2 conferences ~ 200 miles; 1 conference registration, airfare, and lodging. Contract management meetings, 15 X 150 miles. Total: $2,994. DataCoord/ Task 12/Yr2: 10 partner site visits ~ 150 miles; 2 conferences ~ 200 miles; 2 partner quarterly meetings ~ 140 miles; 2 agency/CBDA meetings ~ 160 miles; 2 conference registration, airfare, and lodging. Contract management meetings, 5 X 150 miles. Total: $1,170. DataCoord/ Task 12/Yr3: 20 partner site visits ~ 150 miles; 4 conferences ~ 200 miles; 8 potential partner visits ~ 200 miles; 4 partner quarterly meetings ~ 140 miles; 2 agency/CBDA meetings ~ 160 miles; 2 conference registration, airfare, and lodging. Contract management meetings, 15 X 150 miles. Total: $2,210. Mon.Train/Task 14: 15 workshop personnel ~200 miles, Total: $1080.

Supplies And Expendables

PrgMgr/Task 11/Yr1: (office) supplies: $250 Total: $250 PrgMgr/Task 11/Yr2: (field) cell phone plan 50/mo: $300; (office) supplies: $400 Total: $700 PrgMgr/Task 11/Yr3: (field) cell phone plan 50/mo: $600; (office) supplies: $400 Total: $1,000 DataCoord/Task 12/Yr1: (computing) software $500; network server upgrades: $3,000; (office) supplies: $150 Total: $3,650 DataCoord/Task 12/Yr2: (field) cell phone plan 50/mo: $300; (office) supplies: $250 Total: $550 DataCoord/Task 12/Yr3: (field) cell phone plan 50/mo $600; (office) supplies: $250 Total: $850 MonSysDev/Task 13/Yr1: Data management system upgrades: $600 Total: $600 MonitorTrain/Task 14/Yr1: 10 (field) PDA/GPS units $650/partner: $6,500; ArcPad license $2,000; Total: $8,500.

Services And Consultants

Current partners will conduct monitoring tasks, as follows: Task 1, Napa River, Vegetation Manager, $34.82/hr, 227 hours over 3 years, Total: $7,904.14. Task 2, San Francisquito Creek, Vegetation Manager, $30.25/hr, 223 hours over 3 years, Total: $6,745.75 Task 3, Sonoma Creek, Vegetation Manager,

$33.30/hr, 330 hours over 3 years, Total: $10.989. Task 4, Putah Creek, Streamkeeper, $34.57/hr, 665 hours over 3 years, Total $22.989.05. Task 5, Walnut Creek, Vegetation Manager, $25.95/hr, 277 hours over 3 years, Total: $7,188. Task 6, American River, Vegetation Manager, $34/hr, 526 hours over 3 years, $17,884.00. Task 7, Cache Creek, Vegetation Manager, $38.34/hr, 538 hours over 3 years, Total: $20,626.92. Task 8, Grey Lodge Wildlife Area, Staff Biologist, $23.69/hr, 668 hours over 3 years, Total: $15,824.92. Task 9, San Joaquin, Vegetation Manager, $35/hr, 800 hours over 3 years, Total: $28,000. Task 10, Lindo Channel, Vegetation Manager, $39/hr, 302 hours over 3 years, Total: $11,778.

Task 12, Information Center for the Environment (ICE), Systems Administrator, $60/hr, 180 hours, Total: $10 Task 13, (ICE), Database Specialist, $60/hr, 120 hours/yr, 2 yrs, 40 hours/yr, 3 years, Total: $21,600; Nature Conservancy (TNC) Programmer, $60/hr, 40 hrs/yr, 3 years, Total: $7,200. Task 14, Partner support and training, 1128 hours, $33/hr avg. Total: $37,228.

Equipment

There is no equipment associated with this project.

Lands And Rights Of Way

There are no lands, easements, or rights of way in this proposal.

Other Direct Costs

ProjMgr/Yrs1−3: conferences: $800/Yr 1; $1,600/Yr 2 and 3: Total: $4,000 DataCoord/Yrs1−3 conferences: $800/Yr 1; $1,600/Yr 2 and 3: Total: $4,000

Indirect Costs/Overhead

Indirect costs ($71,379) include the following: Accounting/clerical: $6,300/yr; Management: $6,000/yr; Rent, utilities, insurance, phones, copies: $6,093/yr; Computer

services: $5,400/yr Total $23,793/yr; $71,379/project period

Comments

Environmental Compliance

Arundo donax eradication and coordination program: monitoring and evaluation

CEQA Compliance

Which type of CEQA documentation do you anticipate?
− none
− negative declaration or mitigated negative declaration
− EIR
X categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
X Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
X Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not

yet approved, adopted, or funded.
– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.
California Department of Fish and Game

Is the CEQA environmental impact assessment complete?
No.

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

The programmatic permitting task funded in Phase 2 of the Arundo donax Eradication and Coordination Program will address permitting requirements for all 10 participating partners.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
– none
– environmental assessment/FONSI
– EIS
X categorical exclusion

Identify the lead agency or agencies.

US Fish and Wildlife Service

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

The programmatic permitting task funded in Phase 2 of the Arundo donax Eradication and Coordination Program will address permitting requirements for all 10 participating partners.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
scientific Collecting Permit	–	–	
CESA Compliance: 2081	–	–	

CESA Complance: NCCP	–	–	
1602	–	–	
CWA 401 Certification	X	–	
Bay Conservation And Development Commission Permit	–	–	
reclamation Board Approval	X	–	
Delta Protection Commission Notification	–	–	
state Lands Commission Lease Or Permit	–	–	
action Specific Implementation Plan	–	–	
other **1601/03 CDFG Stream Alteration Agreement**	X	–	

Federal Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
ESA Compliance Section 7 Consultation	–	–	
ESA Compliance Section 10 Permit	–	–	
Rivers And Harbors Act	–	–	
CWA 404	X	–	
other	–	–	

Permission To Access Property	Required?	Obtained?	Permit Number (If Applicable)
permission To Access City, County Or Other Local Agency Land Agency Name	–	–	
permission To Access State Land Agency Name	–	–	
permission To Access Federal Land Agency Name	–	–	
permission To Access Private Land Landowner Name	X	–	

List Of Owners To Be Provided Upon Request.			

If you have comments about any of these questions, enter them here.

Permission to access private land: Many of the new partners in this project have standing jurisdiction in waterways and existing maintenance and weed management programs. With the exception of a few private property owners, most eradication work will be done on lands owned or controlled by project partners.

Land Use

Arundo donax eradication and coordination program: monitoring and evaluation

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
– Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
– No.
– Yes.

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
– No.
X Yes.

Describe briefly the provisions made to secure this access.

Before beginning any work, partners are required to secure written consent from private landowners and public agencies to access infestation sites, and to submit signed copies of all such agreements to the Sonoma Ecology Center.

Do the actions in the proposal involve physical changes in the current land use?
X No.
– Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No.
– Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		–
Farmland Of Statewide Importance		–
Unique Farmland		–
Farmland Of Local Importance		–

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No.
– Yes.

Is the land affected by the project currently under a Williamson Act contract?
– No.
– Yes.

Why is the land use proposed consistent with the contract's terms?

Describe any additional comments you have about the projects land use.