

PSP Cover Sheet

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Proposal Title: Arundo donax control on Burch Creek: Nonnative invasive species  
eradication, flood management and restoration  
Applicant Name: California Department of Water Resources Attn: Julie Cunningham  
Mailing Address: 2440 Main Street, Red Bluff, California 96080  
Telephone: (530) 529-7307  
Fax: (530) 529-7322  
Email: cunning@water.ca.gov

Amount of funding requested: \$390,000 for 3 years

Indicate the Topic for which you are applying (check only one box).

- |  |  |
|--|--|
| <input type="checkbox"/> Fish Passage/Fish Screens   | <input checked="" type="checkbox"/> Introduced Species |
| <input type="checkbox"/> Habitat Restoration         | <input type="checkbox"/> Fish Management/Hatchery      |
| <input type="checkbox"/> Local Watershed Stewardship | <input type="checkbox"/> Environmental Education       |
| <input type="checkbox"/> Water Quality               |  |

Does the proposal address a specified Focused Action? X Yes        No

What county or counties is the project located in? Tehama

Indicate the geographic area of your proposal (check only one box):

- |   |   |
|---|---|
| <input type="checkbox"/> Sacramento River Mainstem                      | <input type="checkbox"/> East Side Trib: _____                  |
| <input checked="" type="checkbox"/> Sacramento Trib: <u>Burch Creek</u> | <input type="checkbox"/> Suisun Marsh and Bay _____             |
| <input type="checkbox"/> San Joaquin River Mainstem                     | <input type="checkbox"/> North Bay/South Bay: _____             |
| <input type="checkbox"/> San Joaquin Trib: _____                        | <input type="checkbox"/> Landscape (entire Bay-Delta watershed) |
| <input type="checkbox"/> Delta: _____                                   | <input type="checkbox"/> Other: _____                           |

Indicate the primary species which the proposal addresses (check all that apply):

- |  |   |
|--|---|
| <input type="checkbox"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon |   |
| <input checked="" type="checkbox"/> Winter-run chinook salmon                                | <input checked="" type="checkbox"/> Spring-run chinook salmon |
| <input checked="" type="checkbox"/> Late-fall run chinook salmon                             | <input checked="" type="checkbox"/> Fall-run chinook salmon   |
| <input type="checkbox"/> Delta smelt   | <input type="checkbox"/> Longfin smelt                        |
| <input type="checkbox"/> Splittail   | <input checked="" type="checkbox"/> Steelhead trout           |
| <input type="checkbox"/> Green sturgeon  | <input type="checkbox"/> Striped bass                         |
| <input checked="" type="checkbox"/> Migratory birds  | <input type="checkbox"/> All chinook species                  |
| <input checked="" type="checkbox"/> Other: <u>see Table 1 (attached)</u>                     | <input type="checkbox"/> All anadromous salmonids             |

Specify the ERP strategic objective and target(s) that the project addresses. Include page numbers from January 1999 version of ERP Volume I and II:

See Table 1 (attached)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Table 1. ERPP strategic objectives, targets and stressors addressed by project.

Category	Strategic Objective (Primary objectives in bold)	ERPP Reference
<b>Stressor: Invasive riparian plants</b>	Eliminate, or control to a level of little significance, all undesirable non-native species, where feasible.	Vol. 1, p. 478
<b>Habitat: aquatic, wetland and riparian habitats</b>	Restore large expanses of all aquatic, wetland, and riparian habitats in the Central Valley and its rivers (including riparian and riverine aquatic, freshwater fish, and essential fish habitat)	Vol. 1, p. 103-104
<b>Target: Sacramento River Ecological Zone, Invasive Riparian and Marsh Plants</b>	Reduce the area of invasive nonnative wood species, such as <i>Arundo donax</i> and salt cedar that compete with native riparian vegetation.	Vol. II, p. 191
<b>Species: Sacramento winter-run, spring-run, fall-run, and late-fall run chinook salmon</b>	Restore winter-run, spring run, fall-run, and late-fall run chinook salmon to the Sacramento River and Bay-Delta Estuary	Vol. 1, p. 220-223
<b>Species: steelhead trout</b>	Restore self-sustaining Central Valley steelhead to Central Valley streams and the Bay-Delta estuary	Vol. 1, p. 229
<b>Species: Swainson's hawk</b>	Restore Swainson's hawk populations	Vol. 1, p. 249
<b>Species: valley elderberry longhorn beetle</b>	Increase and maintain valley elderberry beetle habitat	Vol. 1, p. 286-287
<b>Species: western yellow-billed cuckoo</b>	Restore populations of yellow-billed cuckoo throughout its historical range in the Central Valley	Vol. 1, p. 304
<b>Species: bank swallow</b>	Increase the number of breeding colonies of bank swallow in the Central Valley	Vol. 1, p. 307
<b>Species: least Bell's vireo</b>	Restore least Bell's vireo to representative habitats throughout its former range	Vol. 1, p. 312
<b>Species: California yellow warbler</b>	Restore and protect habitats used by neotropical migrant birds for breeding and forage in the Central Valley	Vol. 1, p. 314
<b>Species: little willow flycatcher</b>	Restore little willow flycatcher populations to habitats throughout its former range in central California	Vol. 1, p. 317-318
<b>Species: native resident fish species</b>	Reverse the decline of native resident fishes	Vol. 1, p. 347
<b>Species: shorebird and wading bird guild</b>	Provide high quality habitat and transition zone [habitat] that allow shorebirds [and wading bird] access to both feeding and nesting	Vol. 1, p. 355-356
<b>Species: waterfowl</b>	Enhance populations of waterfowl for harvest by hunting and for nonconsumptive recreation.	Vol. 1, p. 360
<b>Species: neotropical migratory bird guild</b>	Restore and protect habitats used by neotropical migrant birds for breeding and forage in the Bay-Delta watershed.	Vol. 1, p. 363

Indicate the type of applicant (check only one box):

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> State agency         | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public/Non-profit joint venture | <input type="checkbox"/> Non-profit     |
| <input type="checkbox"/> Local government/district       | <input type="checkbox"/> Private party  |
| <input type="checkbox"/> University                      | <input type="checkbox"/> Other: _____   |

Indicate the type of project (check only one box):

- |                                     |  |
|-------------------------------------|--|
| <input type="checkbox"/> Planning   | <input checked="" type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring | <input type="checkbox"/> Education                 |
| <input type="checkbox"/> Research   |  |

By signing below, the applicant declares the following:

- 1) The truthfulness of all representations in their proposal;
- 2) The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- 3) The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

California Department of Water Resources

Printed Name of Applicant



Signature of Applicant

**TITLE PAGE**

**Title of Project:** Arundo donax control on Burch Creek: Nonnative species eradication, flood management, and restoration

**Primary Contact:**

California Department of Water Resources  
2440 Main Street  
Red Bluff, CA 96080  
Attn: Julie Cunningham  
(530) 529-7307  
[cunning@water.ca.gov](mailto:cunning@water.ca.gov)

**Participants:**

Tehama County Flood Control and Water Conservation District  
California State University, Chico

**Collaborators:**

Natural Resources Conservation Service  
Tehama County Resource Conservation District  
City of Corning  
Sacramento River Advisory Council  
Team Arundo del Norte

**Type of Organization and Tax Status:**

state agency

**Tax Identification Number :**

52-1692634

## EXECUTIVE SUMMARY

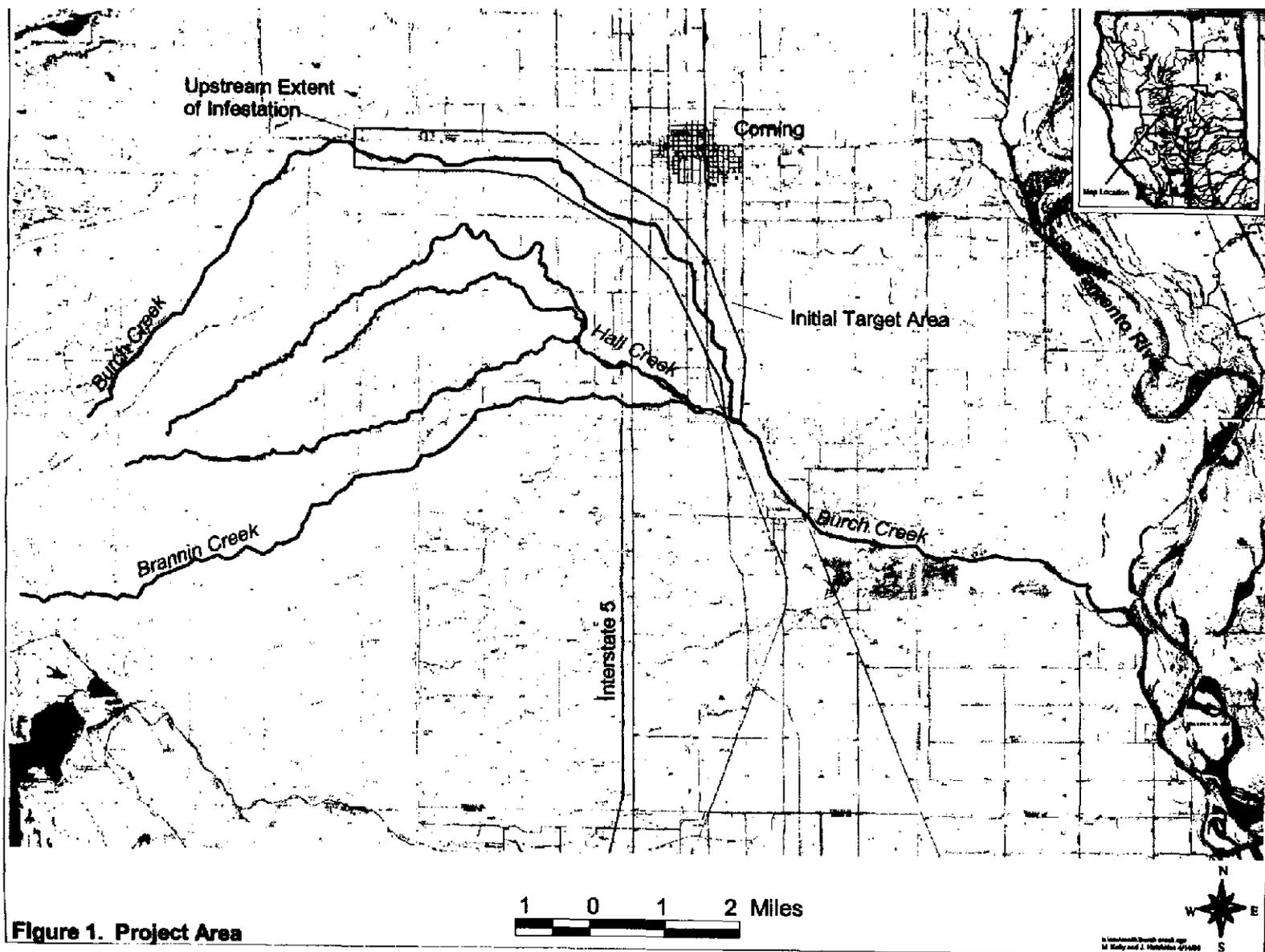
This project seeks \$390,000 over a three year period to develop a partnership approach to eradicate *Arundo donax* and restore and rehabilitate riparian habitat along Burch Creek, a west side tributary of the Sacramento River, in Tehama County (Figure 1). This program is a prototype effort within Tehama County which will benefit other nonnative invasive species programs throughout the Bay-Delta watershed. The purpose of the project is to develop the techniques and approaches for *Arundo donax* eradication and control best suited to the Sacramento Valley ecosystem, while simultaneously meeting city and county flood control needs. Because this program targets the upstream extent of an infestation on a small tributary watershed, in a manner that includes the local community, it can be **a model ecosystem-based approach to the eradication and control of *Arundo* throughout the Sacramento River ecosystem.** The project, which **directly address the CALFED Focused Action related to introduced species,** will result in a prescriptive methodology for *Arundo* eradication on other, geomorphologically similar west-side tributaries to the Sacramento River such as Stony Creek (a main source of infestation to the main stem). It will result in **a sustainable reduction in *Arundo donax* infestation within the Sacramento River Ecological Zone, a net increase in riparian habitat acreage, and, a decrease in habitat fragmentation** along the riparian corridor along tributary of the Sacramento River.

The California Department of Water Resources will coordinate on-the-ground management and control activities carried out by the Tehama County Flood Control and Water Conservation District (FC&WCD) and Tehama County Department of Agriculture with concurrent monitoring activities and restoration trials to be conducted by California State University, Chico's College of Natural Sciences. Coordination will include the development of a community-based educational and advisory group through the Tehama County Resource Conservation District, Sacramento River Advisory Council's Riparian Habitat Committee, the Natural Resources Conservation Service, and Team Arundo del Norte.

The project is located in Tehama County, in the Burch Creek Watershed (Figures 1 and 2). The initial target area begins at the upstream extent of the *Arundo* infestation in the watershed, on Burch Creek.

The primary ecological and biological objective of this proposal is to reduce ecosystem stressors affecting riparian habitat by establishing a **pilot weed control program** to eradicate *Arundo donax*, or giant reed, initially along a 7-mile reach of Burch Creek, a tributary of the Sacramento River. The proposal will eradicate *Arundo* in a systematic manner along a significant length of creek corridor tributary to the Sacramento River. *Arundo donax* is an **invasive riparian plant** stressor that degrades habitat quality and **fragments the native riparian corridor** along both the main stem of the Sacramento River and its tributaries. Project implementation will contribute to **a net increase in the**

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**native riparian forest habitat** within the freely meandering reach between Red Bluff and Chico Landing. The project contributes to the CALFED vision for the Sacramento River Ecological Management Zone by improving, restoring and maintaining the health and integrity of the Sacramento River riverine-riparian and tributary ecosystems.

Monitoring and data evaluation includes eradication success and cost, channel geomorphology, (including effects of *Arundo* eradication on flood management issues such as channel capacity), and restoration success. Monitoring will be conducted by both the California State University Chico and Tehama County.

The California Department of Water Resources Northern District staff will provide public outreach and project management services. The Northern District Office has extensive experience in fisheries and riparian vegetation restoration projects throughout Northern California including the Sacramento River.

Subcontractors are the California State University Chico and Tehama County Flood Control Water Conservation District. This project combines the extensive ecological research and restoration experience of Dr. Tom Griggs and Environmental Projects Manager Jennifer Rotnem with the public works and operations experience of Tehama County Water Resources Manager Ernie Ohlin and Engineering Technician Chrissy Bevans.

This project has been coordinated with the following groups and agencies:

- Sacramento River Advisory Council (SB1086)
- Tehama County Board of Supervisors
- Tehama County Flood Control and Water Conservation District
- Tehama County Department of Agriculture
- Tehama County Resource Conservation District
- Natural Resources Conservation Service (Tehama County)
- City of Corning
- Team Arundo del Norte
- California Department of Fish and Game
- Sacramento River Partners
- Sacramento River Preservation Trust
- The Nature Conservancy
- U.S. Fish and Wildlife Service
- Wildlife Conservation Board

The project meets several CALFED objectives as discussed in the Ecosystem Restoration Program Plan, including those related to ***Stream Meander, Riparian and Riverine Aquatic Habitats***, and ***Invasive Riparian and Marsh Plants***. It also addresses targets for the ***Sacramento River Ecological Zone*** related to ***Invasive Riparian and Marsh Plants***.

## **PROJECT DESCRIPTION**

### **Proposed Scope of Work**

This project seeks \$390,000 over a three year period to develop a partnership approach to eradicate *Arundo donax* and restore and rehabilitate riparian habitat along Burch Creek, a west side tributary of the Sacramento River, in Tehama County (Figure 1). This program is a prototype effort within Tehama County which will benefit other nonnative invasive species programs throughout the Bay-Delta watershed. The purpose of the project is to develop the techniques and approaches for *Arundo donax* eradication and control best suited to the Sacramento Valley ecosystem, while simultaneously meeting city and county flood control needs. The project is **a control-oriented management and research project that directly address the CALFED Focused Action related to introduced species**. Implementation will result in a **prescriptive methodology** for *Arundo* eradication on other, geomorphologically similar west-side tributaries to the Sacramento River such as Stony Creek, which are a main source of *Arundo* infestation to the main stem. The project will result in **a sustainable reduction in Arundo donax infestation within the Sacramento River Ecological Zone, a net increase in riparian habitat acreage, and, a decrease in habitat fragmentation** along the riparian corridor along tributary of the Sacramento River.

The California Department of Water Resources will coordinate on-the-ground management and control activities carried out by the Tehama County Flood Control and Water Conservation District and Department of Agriculture with concurrent monitoring activities and restoration trials to be conducted by California State University, Chico's College of Natural Sciences. Coordination will include the development of a community-based educational and advisory group through the Tehama County Resource Conservation District, Sacramento River Advisory Council's Riparian Habitat Committee, the Natural Resources Conservation Service, and Team Arundo del Norte.

The project area is within the alluvial river-floodplain ecosystem of Burch Creek, a west-side tributary of the Sacramento River, within the Chico Landing to Red Bluff Ecological Management Unit of the Sacramento River Ecological Zone. The initial target area extends from the upstream extent of *Arundo* infestation down 7 miles of creek corridor to the confluence of Burch with Brannin and Hall Creeks, approximately 7 miles upstream of the confluence with the Sacramento River (Figures 1 and 2). Secondary target areas include infestations further downstream on Burch Creek and on Hall and Brannin Creeks.

The proposed project includes four tasks or phases: public outreach, agency coordination and project management; compilation of baseline information and monitoring; eradication activities; and, restoration trials. The project is designed so that: 1) information learned during each year of the project can be used in subsequent years; 2) successful techniques can be incorporated into other restoration and flood control activities within the region; and 3) regional agencies and advisory groups can use the

project as a "jumping off" place for future activities.

- I. Public Outreach, Agency Coordination and Project Management.** This task will be initiated the first year, and carried out for the duration of the project. The local advisory group is envisioned to continue after the conclusion of the project.

  - Work with landowners, local entities and agency personnel to develop a local advisory group on exotics invasive to riparian areas. This group will conduct field days in cooperation with the Tehama County RCD, in association with the eradication, monitoring and restoration activities;
  - Coordinate with permitting agencies to obtain necessary permits and agreements required for Tasks II-IV;
  - Coordinate activities between the California Department of Water Resources, Tehama County, and the California State University, Chico (project management).
  
- II. Baseline Information and Monitoring.** Baseline conditions will be assessed and permanent monitoring sites (cross-sections and photo points) will be established during the first year. Monitoring will occur annually.

  - Develop base map of watershed, including extent and intensity of *Arundo* infestation;
  - Gather existing topographic, geologic, soils, and cross-section information;
  - Prepare outline of existing conditions;
  - Establish and monitor channel cross-sections and photomonitoring points and compile results;
  - Track treatment application, monitor kill rate, and identify sites needing additional treatment;
  - Track and report on costs and acres eradicated;
  
- III. Eradication Activities.** Eradication activities will take place during each year of the project. Cutting and burning will occur the first two years; herbicide application will occur during each year.

  - Use hand crews to cut *Arundo donax* stems, pile stems, and burn. Tehama County FC&WCD has historically subcontracted with the Salt Creek Conservation Camp crews to do similar work on flood control projects. Under this project, they will be subcontracting with the Conservation Camp, the California Conservation Corps (CCC) or Americorps.
  - Treat regrowth on cut stems with Roundup solution approximately two months after cutting; retreat the following season. Licensed applicators will work down the creek bed during the dry season using hand-held sprayers mounted on a quad-runner. For spots not easily accessible, backpack sprayers will be used.

**IV. Restoration Trials.** Restoration trials will be conducted on sites during the second and third years of the project. Restoration will be closely coordinated with Tehama County FC&WCD and private landowners in order to ensure that species selection and placement fit with flood management needs.

- Select restoration sites and species;
- collect and propagate plant materials;
- Implement restoration trials in reach that was treated the previous season;
- Monitor and report on restoration trials.

**Location and/or Geographic Boundaries of the Project**

The project is located in Tehama County, in the Burch Creek Watershed (Figures 1 and 2). The initial target area begins at the upstream extent of the *Arundo* infestation in the watershed, on Burch Creek.

## **ECOLOGICAL/BIOLOGICAL BENEFITS**

### **Primary Ecological/Biological Objectives:**

The primary ecological and biological objective of this proposal is to reduce ecosystem stressors affecting riparian habitat by establishing a **pilot weed control program** to eradicate *Arundo donax*, or giant reed, initially along a 7-mile reach of Burch Creek, a tributary of the Sacramento River. The proposal will eradicate *Arundo* in a systematic manner along a significant length of creek corridor tributary to the Sacramento River. *Arundo donax* is an **invasive riparian plant** stressor that degrades habitat quality and **fragments the native riparian corridor** along both the main stem of the Sacramento River and its tributaries (ERP, pp. 149, 153). Project implementation will contribute to a **net increase in the native riparian forest habitat** within the freely meandering reach between Red Bluff and Chico Landing. (ERPP Vol. I, pp. 80, 103, 104, and 107). The project contributes to the CALFED vision for the Sacramento River Ecological Management Zone by improving, restoring and maintaining the health and integrity of the Sacramento River riverine-riparian and tributary ecosystems.

**Species:** The species that depend on riparian forests and its associated shaded riverine aquatic habitat along the Sacramento River and its tributaries in the vicinity of this project include special-status species such as Swainson's hawk, valley-elderberry longhorn beetle, Sacramento winter-, spring- and fall and late-fall run chinook Salmon, steelhead trout, least Bell's vireo, California yellow warbler, western yellow-billed cuckoo, little willow flycatcher, bank swallow, California red-legged frog, western pond turtle, native anuran amphibians, and neotropical migratory birds.

**Habitats:** Riparian and Riverine Aquatic Habitats (Shaded riverine aquatic) and Riparian and Riverine Aquatic Habitats (riparian scrub, woodland, and forest habitat).

**Quantification of Benefits:** When fully implemented, this project will result in the control and eradication of *Arundo donax* along a minimum of 7 miles of Burch Creek, a tributary of the Sacramento River. The infestation rate ranges from 1/4 acre to 4 acres per mile, displacing a total of approximately 30 acres of riparian habitat within the 7-mile area. Eradication in the initial target area will result in a net increase of approximately 20 acres of riparian habitat, and will eliminate an infestation source on the mainstem of the Sacramento River. If weather and streamflow conditions are favorable, infestations on Hall and Brannin Creeks (tributary to Burch) will also be controlled. This will result in an additional reduction in the infestation and an increase in native habitat.

**Primary/Secondary Benefits:** Development of a prescriptive methodology for *Arundo* eradication on other, geomorphologically similar west-side tributaries to the Sacramento River; a sustainable reduction in *Arundo* infestation within the Sacramento River Ecological Zone; net increase in riparian habitat acreage; and, decrease in habitat fragmentation along the riparian corridor along a tributary of the Sacramento River. Project will result in improvement of habitat quality along the mainstem of the Sacramento River and consequent benefits to the wide range of special status species listed above.

**Third party benefits:** Benefits to third parties include: reduced flooding where *Arundo donax* and associated sedimentation has reduced channel capacity and piled at culverts and

bridges; reduced bank erosion where *Arundo donax* has created in channel splits and increased lateral channel movement, erosion, an increase in the aesthetic value of the Burch Creek corridor for residents of Tehama County and the City of Corning.

**Benefits to other programs:** This project will provide flood control, habitat, and aesthetic benefits for Tehama County and the City of Corning, and will benefit the existing Tehama County Flood Control and Water Conservation channel maintenance program. The project serves as a pilot eradication effort that over time will benefit riparian habitat restoration activities along the Sacramento River mainstem, including acquisition and restoration activities by the U.S. Fish and Wildlife Service, California Department of Fish and Game, The Nature Conservancy, Sacramento River Partners, and the Sacramento River Preservation Trust.

**Durability/Ecosystem Approach/Adaptive Management:** Several aspects of the project contribute to its durability and ability to be self-sustaining: 1) eradicating *Arundo* at the upstream extent of the infestation; 2) targeting the entire infestation, including clumps both in the channel and on the banks; 3) kill-rate monitoring associated with systematic biannual retreatment; and, 4) restoration of native plants in treated area. Because this program targets the upstream extent of an infestation on a small tributary watershed, in a manner that includes the local community, it can be a model of an ecosystem-based approach to the eradication and control of *Arundo* throughout the Sacramento River ecosystem. This project takes an adaptive management approach. Each component will inform the other, so that eradication strategies can be modified depending on results. Since factors such as rainfall and summer weather will affect the timing of specific activities such as herbicide spraying, the project is structured in a flexible manner.

**Linkages:**

**Sacramento River Riparian Habitat Program (SB1086):** The Burch Creek proposal is a demonstration project that directly addresses the problem of rapidly spreading *Arundo* infestation damaging Sacramento River's native ecosystems.

**Deer Creek Watershed Conservancy:** The proposed project will provide a local and statewide technical advisory group that can work with the Deer Creek Conservancy and other similar watershed groups in Tehama County on *Arundo donax* eradication.

**Team Arundo del Norte:** The Burch Creek proposal is tied into nonnative invasive species (NIS) research and eradication efforts throughout the Bay Delta and Sacramento Valley, through its participation in Team Arundo del Norte (TAdN), a multi-agency partnership working to coordinate with *Arundo* eradication, research, and education efforts in Northern and Central California.

**Additional Linkages:** This project addresses the some or all of the goals of the California Riparian Habitat Conservation Program, California Partners in Flight Riparian Habitat Joint Venture, California Rivers Assessment Project, Central Valley Project Improvement Act, Anadromous Fish Restoration Program, and the U.S. Army Corps of Engineers Comprehensive Study

**ERP strategic objectives and targets:** Project implementation will directly address several strategic objectives, stressors and targets discussed in CALFED's Ecosystem

Restoration Program Plan, including:

- **Stream Meander** (Vol. 1, p. 80-81) This project addresses the invasive riparian plant *Arundo donax*, a stressor that impairs the health of Sacramento River **stream meander corridors**.
- **Riparian and Riverine Aquatic Habitats** (Vol. 1, p. 149, 151) This project addresses stressors to riparian and riverine aquatic habitat along Burch Creek and the main stem of the Sacramento River, including **habitat fragmentation and displacement** by *Arundo donax*, an invasive non-native plant.
- **Invasive Riparian and Marsh Plants** (Vol 1, p. 478) This project addresses the short-term objective of working with sectors affected by the introduction of invasive species to halt their spread; eliminating, or controlling to a level of little significance, undesirable non-native species; and, **eradicating and containing** those species for which this can be readily done.
- **Sacramento River Ecological Zone, Invasive Riparian and Marsh Plants** (Vol. II, p. 191), to reduce the area of invasive nonnative wood species, such as *Arundo donax* and salt cedar that compete with native riparian vegetation.

The project also addresses additional objectives related to the main stem of the Sacramento River and its tributaries as outlined in Table 1 (included with cover sheet).

**How will proposal help CALFED?** This project contributes to the achievement of the Ecosystem Restoration Program Goals, as listed in the *Strategic Plan for Ecosystem Restoration* (Chapter 5, p. 27) to: rehabilitate natural process in the Bay-Delta System in ways that are self-sustaining and favor native members of its natural communities; 2) protect or restore functional habitat types for public values; and, 3) reduce the negative biological and economic impacts of established non-native species.

**System-Wide Ecosystem Benefits**

The project dovetails with the CalFed's Stage 1 Expectations in relation to invasive riparian and marsh plants by implementing a pilot eradication project in an small demonstration watershed, while simultaneously conducting restoration trials. It complements current statewide work by providing detailed data to a statewide clearinghouse envisioned by TAdN.

**Compatibility with Non-Ecosystem Objectives**

- **Water Use Efficiency** Horticultural experts have estimated that *Arundo* evapotranspires approximately 1/3 more water than native species. Replacement of 20 acres of *Arundo donax* by native species could result in a savings of about 34 af of water per year.
- **Non-structural Flood Control Benefits** The project improves channel capacity, while resulting in a net increase in riparian habitat;
- **Watershed Management** The project works with local landowners, watershed groups and agencies to address watershed issues in a way that develops the institutional structure to support similar future activities.

### **TECHNICAL FEASIBILITY AND TIMING**

#### Other alternatives examined:

1. *Continue existing flood control activities in Burch Creek.* This alternative was not selected because the current program targets both native and non-native species in the channel bottom, is not self-sustaining because *Arundo* clumps on banks are not targeted, and does not include a monitoring or restoration component.
2. *Implement program only after valley-wide assessment of non-native invasive species in the riparian habitat of the Central Valley is complete.* This alternative was not selected because short-term pilot eradication projects must be implemented at representative locations throughout the ecosystem so that techniques and strategies are well developed. Then, when assessment is complete and a wider long-range eradication plan is in place, implementation can occur immediately.
3. *Implement similar program on Jewett and Elder Creeks.* This alternative was not selected because the infestation on these creeks is more extensive, and would include many more landowner participants. The chosen reach of Burch Creek can be implemented within the three-year time frame and resources of the participants.

#### **Permits/Agreements:**

The California Department of Water Resources will be responsible for compliance with a number of state and federal regulations. Major permitting issues include the state and federal Endangered Species Act, the Department of Fish and Game Streambed Alteration Agreement (under Section 1601 of the Fish and Game Code), Section 404 of the Clean Water Act (wetland issues), Section 401 of the Clean Water Act (water quality), and Caltrans encroachment permit. In addition, Tehama County will be responsible for obtaining right of entry permits from all private landowners whose property will be accessed.

## **MONITORING AND DATA COLLECTION METHODOLOGY**

### **Biological and Ecological Objectives, Monitoring Parameters, and Data Collection Approach:**

The primary ecological and biological objective of this proposal is to reduce ecosystem stressors affecting riparian habitat by establishing a **pilot weed control program** to eradicate *Arundo donax*, or giant reed, along Burch Creek, a tributary of the Sacramento River. While other eradication efforts in the Sacramento Valley have been very site-specific, this approach addresses the issue at the watershed level. The techniques and approach used at this small-watershed scale can subsequently be applied to larger tributary infestations. The project includes the following key subobjectives:

- **Subobjective 1.** Eradicate *Arundo* from initial target area on Burch Creek. Monitor *Arundo* treated with herbicide to determine kill-rate and the need for follow-up treatment. The number of person-hours required for eradication and all other costs will be recorded.
- **Subobjective 2.** Describe the impacts of *Arundo* on channel morphology. Surveyed cross-sections of the channel will be installed in year one at locations chosen by geologists. These will be surveyed again at the end of the project (or any other future time) to determine any changes or movement of the channel. In addition, historic cross-sections from the Natural Resources Conservation Service will be located and surveyed during the first year of this project. Photo-points will be installed at each cross-section to visually document any changes.
- **Subobjective 3.** Evaluate the need for riparian restoration after removal of *Arundo*. Searches for naturally occurring seedlings of native plants will be carried out each year. One of the basic tenets of exotic plant control is that other species of plants will colonize (or must be planted in) the space once occupied by the nonnative. Searches for naturally occurring seedlings and sapling of native plants will be carried out each year as a measure of the need for restoration of riparian plant communities at particular sites.
- **Subobjective 4.** Initiate riparian restoration plantings where *Arundo* has been killed with special focus on the action of native plants to slow bank erosion. Experimental plantings of native species will occur at appropriate locations along the channel, focusing on sites where bank erosion is currently taking place, or has the potential. These locations will be chosen with the consultation of a geologist.

### **Data Evaluation Approach:**

The data collected over the three years of the project will be useful as a baseline for future, post-project comparisons. The historic channel cross-sections will be located and re-surveyed in the first year of this project.

Table 2. Monitoring and Data Collection Information

Hypothesis/Question to be Evaluated	Monitoring Parameters and Data Collection Approach	Data Evaluation Approach	Comments
An effective method for reducing nonnative invasive plant stressors in the riparian ecosystem can be developed through the establishment of a pilot weed control program to eradicate <i>Arundo donax</i> , or giant reed, along a 7-mile reach of Burch Creek, a tributary of the Sacramento River.	Baseline mapping will be conducted during first year of project; eradication and restoration techniques, costs, and effectiveness will be tracked.	Preproject conditions (as outlined in existing conditions report) will be compared with post-project conditions as determined through monitoring reports.  Increases in channel capacity and other flood control considerations will be assessed.	Information will be shared with other nonnative invasive species eradication programs in riparian areas throughout the state.
Subobjective 1: Eradicate 7 miles of <i>Arundo</i>	Lack of green shoots on treated clumps	Percent dead	
Subobjective 2: Impact of <i>Arundo</i> on channel morphology	Surveyed channel cross-sections; photo points	Changes over time of channel location and shape; Assess impact of <i>Arundo</i> removal on channel capacity.	Available post-project
Subobjective 3: Impact of <i>Arundo</i> on reproduction of native trees and shrubs	Search for seedlings	Number of seedlings per mile of channel	
Subobjective 4: Pilot restoration of native plants	Survival by species; effectiveness of erosion control	Comparisons by species and planting site	Effectiveness at erosion control will be seen during final year of project, and after completion.

## **LOCAL INVOLVEMENT**

### ***County notification:***

The project is a cooperative project with the Tehama County FC&WCD and Department of Agriculture, and has been discussed at length with the water resources manager and other personnel in both departments. A notification letter to the county is attached (Attachment A) The project was presented to the both the Tehama County Flood Control Board and the Board of Supervisors, and both groups expressed verbal support. A written letter of support from the Board of Supervisors is attached (Attachment B). In addition, the project has been discussed with the director of public works for the City of Corning, and a letter of support is attached (Attachment C).

### ***Groups and organizations:***

Presentations have been made to the Sacramento River Advisory Council and its Riparian Habitat Committee. Both groups express support, and a letter from the Advisory Council is attached (Attachment D). A brief presentation has also been made to Team Arundo del Norte (Attachment E) at the San Francisco Estuary Institute, and to the Tehama County Resource Conservation District in Red Bluff. Both groups expressed a willingness to coordinate on the project. The project has also been discussed extensively with the Sacramento River Preservation Trust, and with the nonprofit groups Sacramento River Partners and The Nature Conservancy (TNC).

### ***Landowners:***

The project area includes approximately 100 private landowners. The Tehama FC&WCD and the Department of Water Resources have contacted several key landowners and described the project to them. Any landowner concerns that arise will be addressed before and during implementation

### ***Public Outreach:***

Outreach will commence early in the first year under the first project component. The Tehama County FC&WCD channel maintenance program maintains a map and database of all creekside property owners, and routinely obtains rights of entry permits from them when they conduct flood management activities. During project implementation, the County will continue to play this role. Outreach will also take place through the coordination activities, workshops and field days, and outreach materials.

### ***Third party impacts:***

Potential third party impacts could include localized changes to channel morphology (e.g. changes in bank erosion and channel deposition patterns). Changes to channel morphology will be closely monitored, and third-party impacts addressed as part of the project's adaptive management approach. For example, restoration activities can be targeted and tailored to a site where it would reduce potential third-party impacts.

**COST**

**Table 3. Budget**

Task	Direct Labor Hours	Direct Salary and Benefits	Service Contract (TCFC& WCD)	Service Contract (CSUC)	Material and Acquisition Costs	Misc. and other Direct Costs	Overhead and Indirect Costs	Total Cost
I. Public Outreach, Agency Coordination and Project Management	477	14,300		25,000			18,200	57,500
II. Baseline Information and Monitoring	177	5,300	4,200	79,000			6,700	95,200
III. Eradication Activities	27	800	133,200				1000	135,000
IV. Restoration Trials				102,300				102,300
<b>TOTALS:</b>	<b>681</b>	<b>20,400</b>	<b>137,400</b>	<b>206,300</b>			<b>25,900</b>	<b>\$ 390,000</b>

California Department of Water Resources  
 Arundo donax, Burch Creek

QUARTERLY BUDGET

TASK	1 <sup>st</sup> Qtr. 2000	2 <sup>nd</sup> Qtr. 2000	3 <sup>rd</sup> Qtr. 2000	4 <sup>th</sup> Qtr. 2000	1 <sup>st</sup> Qtr. 2001	2 <sup>nd</sup> Qtr. 2001	3 <sup>rd</sup> Qtr. 2001	4 <sup>th</sup> Qtr. 2001	1 <sup>st</sup> Qtr. 2002	2 <sup>nd</sup> Qtr. 2002	3 <sup>rd</sup> Qtr. 2002	4 <sup>th</sup> Qtr. 2002	TOTALS
I.	8,000	8,000	8,000	8,000	4,000	4,000	4,000	4,000	2,500	2,500	2,500	2,000	\$57,500
II	12,000	12,000	12,000	12,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	5,200	\$95,200
III	25,000	25,000	25,000	25,000	6,000	6,000	6,000	6,000	3,000	3,000	3,000	2,000	\$135,000
IV			3,000	3,000	12,300	12,000	12,000	12,000	12,000	12,000	12,000	12,000	\$102,300
<b>TOTAL</b>	<b>45,000</b>	<b>45,000</b>	<b>48,000</b>	<b>48,000</b>	<b>28,300</b>	<b>28,000</b>	<b>28,000</b>	<b>28,000</b>	<b>23,500</b>	<b>23,500</b>	<b>23,500</b>	<b>21,200</b>	<b>\$390,000</b>

**PROJECT TOTAL: \$ 390,000**

1-016381

## **SCHEDULE**

- **Task I, Public Outreach, Agency Coordination and Project Management**  
*First year milestones* include formation of technical advisory group, collection of all baseline information, completion of base map and existing conditions report, monitoring locations established, environmental permits obtained, all landowners contacted. Total cost: \$32,000.  
*Second year milestones* include coordination of eradication, monitoring and restoration, continuation of advisory group and landowner outreach. Total cost: \$16,000  
*Third year milestones* include a second successful season of eradication, monitoring, and restoration activities, and development of final report on eradication costs, monitoring and restoration results to be distributed to CALFED, SB1086, Team Arundo del Norte and regional watershed groups and agencies. Total cost: \$9,500.
- **Task II, Baseline Information and Monitoring**  
*First year milestones* include: establishment of permanent channel cross sections and photo points, complete survey of channel for restoration species sources and sites, monitoring of costs and rates of first year eradication activities; development of basemap and existing conditions report. Total cost: \$48,000  
*Second year milestones* include continued eradication, channel geomorphology, photomonitoring and restoration monitoring. Total cost: \$24,000  
*Third year milestones* include final channel cross-sections measurements and reporting on all monitoring activities to the project manager. Total cost: \$23,200
- **Task III, Eradication Activities**  
*First year milestones* include cutting and burning of all *Arundo* on initial pilot reach, and one treatment of all surviving stalks. Total cost: \$100,000  
*Second year milestones* include two herbicide retreatments of initial pilot reach, and cutting and burning of additional reaches, as possible. Total cost: \$24,000  
*Third year milestones* include spot retreatment of cut and burned areas, as necessary, and cutting and burning of additional reaches, as possible. Total cost: \$11,000
- **Task IV, Restoration Trials**  
*First year milestones* include completion of survey for restoration sites and native plant sources, germination and establishments of plants in greenhouse, acorn collection. Cost: \$6,000  
*Second year milestones* include: working with landowners and local highschool to plant and restore treated areas on a site-specific basis, installation of monitoring transects, includes restoration of approximately 10 acres of riparian habitat. Total cost: \$ 48,300  
*Third year milestones* include: completion of monitoring of previous year restoration, working with landowners and local high school to plant and restore additional treated areas, continued collection of plant material, installation of additional monitoring transects. Includes restoration of approximately 10 acres of riparian habitat. Cost: \$48,000

## **APPLICANT QUALIFICATIONS**

The California Department of Water Resources will manage and administer the project and provide technical services. DWR will coordinate monitoring, eradication and restoration activities. Control and eradication activities will be conducted by Tehama County FC&WCD and Tehama County Department of Agriculture, and monitoring and restoration activities will be conducted by the California State University, Chico Department of Natural Sciences in cooperation with technical staff from the California Department of Water Resources. Other collaborators (listed from local to statewide) that will be consulted regularly include:

- City of Corning
- Corning Water District
- Tehama County RCD (including Reeds and Red Bank Creek watershed group)
- Sacramento River Preservation Trust
- Sacramento River Partners
- Sacramento River Advisory Council and Riparian Habitat Committee (including representatives from U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game)
- The Nature Conservancy
- Team Arundo del Norte

### **California Department of Water Resources**

- **Julie Cunningham, Environmental Specialist**, will manage the project, coordinate county and city activities, coordinate outreach efforts, and take the lead in the development of outreach materials. Ms. Cunningham is a geographer who has for the past five years provided staff service to the Sacramento River Advisory Council, including taking the lead in the development of the *Sacramento River Conservation Area Handbook*.
- **Koll Buer, Senior Engineering Geologist**, will assist with the selection and establishment of permanent cross sections in the project area. Koll is a geomorphologist who has worked and studied in the Sacramento Valley for over 20 years. Mr. Buer has conducted numerous studies on erosion, sedimentation, channel movement, and other geomorphological issues on the Sacramento River and its tributaries.
- **Stacy Cepello, Environmental Specialist**, will provide technical services for all project components. Mr. Cepello is an ecologist who has supervised development of the Sacramento River geographical information system, managed the Sacramento River Riparian Habitat Program, and provides a wide variety of technical services to watershed groups throughout the Central Valley
- **Joyce Lacey, Environmental Specialist**, will provide technical service in the development of workshops, field days, and outreach materials. Ms. Lacey is a botanist who has worked for DWR for over 18 years conducting sensitive plant surveys, wetland delineations and restoration, environmental compliance activities

- **Eric Haney, Research Analyst**, will provide technical services in the preparation of the digital base map, and mapping of *Arundo* infestation. Mr. Haney is a specialist in Geographic Information Systems, and has led and managed GIS technical support teams for the California Department of and Game and the California Department of Water Resources.

#### Tehama County

- **Ernie Ohlin, Water Resources Manager**, will oversee and coordinate county activities, including obtaining right of entry permits, subcontracting with hand crews, cutting, burning, herbicide application, and eradication monitoring. Mr. Ohlin has worked in Tehama County for nearly 30 years, is an experienced construction contract administrator, and has extensive experience supervising flood emergency public works repairs.
- **Dave Stoffel, Agricultural Biologist**, will supervise and conduct herbicide application activities during all phases of the project. Mr. Stoffel has a qualified herbicide applicators license from the State of California.
- **Chrissy Bevens, Engineering Technician**, will coordinate county activities, including landowner coordination, obtaining right-of-entry permits, and subcontracting and supervising hand crews. Ms. Bevens has worked for Tehama County for three years, and has obtained right of entry permits and coordinated hand crews for the county's channel maintenance program.

#### California State University, Chico

- **Tom Griggs, Adjunct Professor**, will manage monitoring and restoration project components. Dr. Griggs is an ecologist with extensive experience in the study and restoration of Central Valley riparian ecosystem. He has worked as preserve and area manager and ecologist for The Nature Conservancy on the Sacramento River Project.
- **Jennifer Rotnem, Environmental Projects Coordinator**, will assist with technical and management activities associated with monitoring and restoration project components. Ms. Rotnem has worked as Restoration Coordinator for The Nature Conservancy on the Sacramento River Project.

## DEPARTMENT OF WATER RESOURCES

NORTHERN DISTRICT

1440 MAIN STREET

RED BLUFF, CA 96080-2398



April 15, 1999

Mr. Ross M. Turner, Chair  
Tehama County Board of Supervisors  
Post Office Box 250  
633 Washington Street  
Red Bluff, California 96080

Dear Mr. Turner:

This is to let you know that the California Department of Water Resources is submitting two funding proposals to the CALFED Bay-Delta Program that fall within the borders of Tehama County. These projects are being coordinated with the County.

The first project, *Implementation of Riparian Corridor Management along the Woodson Bridge Subreach of the Sacramento River*, requests funding for: baseline data collection (topography, bathymetry, and geology) at the Woodson Bridge site; implementation of rock removal at Kopta Slough and rock placement on the west bank of the river between the bridge and the City of Corning sewage outfall, computer modelling of channel dynamics, and the development of longterm adaptive management recommendations for the site.

The second project, *Arundo donax control on Burch Creek: Non-native Invasive Species Eradication, Flood Management, and Restoration*, requests funding to eradicate *Arundo donax*, or giant reed, within the Burch, Hall, and Brannin Creek watershed. As you are aware, this proposal is being developed in cooperation with the Tehama County Flood Control and Water Conservation District and the California State University, Chico. Thank you very much for the support expressed by the Board of Supervisors on this proposal.

If you have any questions, please call me at (530) 529-7342 or Stacy Cepello at (530) 529-7352.

Sincerely,

A handwritten signature in black ink, appearing to read "Naser Bateni".

Naser J. Bateni, Chief  
Northern District

cc: Mr. George Robson  
Tehama County Planning Department  
444 Oak Street  
Red Bluff, California 96080

Board of Supervisors  
COUNTY OF TEHAMA

Attachment B

District 1 - Barbara Malver  
District 2 - George Russell  
District 3 - Charles Willard  
District 4 - Ross Turner  
District 5 - Bill Borror



*Tehama County Courthouse*

Richard Robinson  
Chief Administrator

April 13, 1999

Mr. Lester Snow, Executive Director  
CALFED Bay Delta Program  
1416 Ninth Street  
Sacramento, CA 95814

Dear Mr. Snow:

The Tehama County Board of Supervisors strongly supports funding of the proposal being submitted to the CALFED Bay Delta Program by the California Department of Water Resources to conduct *Arundo donax* control on Burch Creek. In collaboration with Tehama County and the California State University, Chico, DWR proposes to control *Arundo donax*, or giant reed, along a 7-mile portion of Burch Creek, do monitoring and assessment, and conduct restoration activities.

*Arundo donax*, or giant reed, is a common invasive plant in streams throughout Tehama County, and in the Central Valley. This aggressive and fast-growing plant is problematic from both a flood control and riparian habitat restoration perspective, and it is important that a pilot project be conducted in the northern Sacramento Valley so that we can establish the most effective control techniques for this area.

Burch Creek is an ideal location for such a pilot project. The creek flows through natural, agricultural, and residential areas, and is relatively small, making complete eradication a very real possibility. It is a direct tributary to the Sacramento River, where the problem of giant reed is also growing. There is considerable local interest in clearing giant reed because of its habit of growing in mid-channel where it blocks floodflows, lessening channel capacity, but the project also offers an important opportunity for Tehama County to work with its residents to combine environmental benefits with a flood control purpose. The lessons learned on Burch Creek can then be applied to other large infestations within the Central Valley.

Thank you for your consideration.

Sincerely,

Ross M. Turner  
Chairman

RT:sh

Meetings 10:00 A.M. Tuesday of Each Week

P.O. Box 250 • 633 Washington St., Red Bluff, CA 96080 • (530) 527-4655 • FAX (530) 529-0980

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I-016386



# City of Corning

794 Third St. Corning, CA 96021 (530) 824-7020 Fax (530) 824-2489

April 8, 1999

California Department of Water Resources  
2440 Main Street  
Red Bluff, CA 96080  
Julie Cunningham

Dear Ms. Cunningham

The City of Corning would most definitely be interested in the eradication program of *Arundo donax* or as we call it bamboo, in the channel and banks of Burch Creek within the City Limits of Corning. As stated in the letter I received from you today, the eradication program would be west of Interstate Five beginning at 10<sup>th</sup> Avenue and ending at the confluence with Hall and Brannin Creeks at the Tehama-Colusa Canal.

The City would also like to see a similar program implemented for Jewett Creek, which runs through the City from Interstate Five to Woodson Avenue. Eradication of *Arundo donax* in the channel and banks of Jewett Creek from the power lines located west of town to the Sacramento River would be something the City of Corning would like the Department of Water Resources to look into. City Staff is willing to meet with DWR, and County Staff, to address all of the above issues.

Sincerely,

Tom L. Russ  
Director of Public Works

**SACRAMENTO RIVER ADVISORY COUNCIL**  
 c/o CALIFORNIA DEPARTMENT OF WATER RESOURCES  
 2440 MAIN STREET  
 RED BLUFF, CALIFORNIA 96080

*Denny Bungarz, Chair • (916) 934-7342 • dbungarz@water.ca.gov*  
*Barry Smith, Sacramento River Conservation Area Coordinator • (916) 934-7401 • barry@srca.com*

April 15, 1999

Mr. Lester Snow, Executive Director  
 CALFED Bay Delta Program  
 1416 Ninth Street  
 Sacramento, CA 95814

**Rafi Aranda** *downer control on Birch Creek: Non-native invasive species eradication, flood management and restoration.*

**Proposed:** California Department of Water Resources, Northern Division

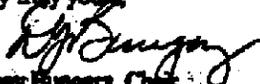
Dear Mr. Snow:

Based on the information provided by the project proponent of this project and with the understanding of continued studies and hydrologic and hydraulic review we find that this project is consistent with and furthers the objectives of the Sacramento River Conservation Area (SB1086) as outlined in the SRCA Handbook. An essential part of this effort continues to be close coordination with affected public and private landowners, government agencies, and other groups and individuals. The essence of the Sacramento River Conservation Area (SB1086) process is communication and coordination from a wide variety of interests along the river.

This proposal has been presented to both the Advisory Council and its' Riparian Habitat Committee, and the Council has authorized me to forward its' actions on this proposal.

Thank you for your consideration.

Very truly yours,

  
 Denny Bungarz, Chair  
 Sacramento River Conservation Area Advisory Council

cc: California Department of Water Resources  
 Tehama County Department of Public Works  
 Tehama County Department of Agriculture  
 California State University, Chico College of Natural Sciences

**TEAM ARUNDO DEL NORTE**

A multi-agency partnership dedicated to the control of the invasive plant *Arundo donax* where it threatens riparian ecosystems in Northern and Central California

205 First Street West  
Sonoma, CA 95476

<http://ceres.ca.gov/tadn>  
[tadn@ceres.ca.gov](mailto:tadn@ceres.ca.gov)

April 12, 1999

To Whom It May Concern,

Team Arundo del Norte wishes to express its support and recommendation for the CALFED project proposed by the California Department of Water Resources for the eradication of *Arundo donax* along a 7-mile portion of Burch Creek, a tributary of the Sacramento River in Tehama County.

TAdN seeks to promote and encourage local environmental stewardship groups to address the problem of *Arundo* infestation of riparian ecosystems as part of a comprehensive stream conservation program. This project, a collaboration between DWR, Tehama County, and the California State University, Chico, is important and timely for the preservation of the health of the Sacramento River and its ability to continue to support its remaining biological diversity. *Arundo* threatens the integrity of this ecosystem by changing stream geomorphology and displacing native species. In addition to these ecological impacts, *Arundo* causes negative economical, social and public health impacts by creating an increasing trend toward fire and flooding.

The Burch Creek project will not only directly address the rapidly spreading *Arundo* infestation damaging Sacramento River's native ecosystems, it will contribute to the greater pool of knowledge badly needed by other *Arundo* eradication efforts about cost-effective and environmentally sound methods for removal of *Arundo*. It will also build local stewardship by raising awareness of the threat posed by this and other non-native invasive species, and the value of a functioning native riparian ecosystem.

Team Arundo del Norte recommends this project for funding by CALFED because it meets the goals of the CALFED project and its NIS Strategic Plan to protect native habitat from the harmful effects of non-native invasions.

Sincerely,



Deanne DiPietro for Team Arundo del Norte

*US Environmental Protection Agency • CA Department of Water Resources • Napa Ag Commissioner  
Jones & Stokes Associates • CA Department of Fish and Game  
San Francisco Estuary Institute • UC Berkeley • UC Davis • The Nature Conservancy  
Sonoma Ecology Center • CERES • Circuit Rider Productions*