Stony Creek Hydrology and Non-Native Eradication Project

Project Information

1. **Proposal Title:**

   Stony Creek Hydrology and Non-Native Eradication Project

2. **Proposal applicants:**

   Donnan Arbuckle, Glenn County Resource Conservation District
   Dr. Tomas Griggs, CSU, Chico - College of Natural Sciences
   Margie Sawyer, Stony Creek Landowner Coalition
   John Carlon, Sacramento River Partners
   Susan Sjoberg, Glenn County Department of Education
   Vince Minto , Glenn County Planning Department
   Richard Holman , CSU, Chico College of Engineering,Computer Science and Technology
   Marc Horney , U.C. Cooperative Extension
   David Stoffel, Tehama County Ag. Commissioner
   Chuck Nelson , CSU, Chico, Geographic Information Center

3. **Corresponding Contact Person:**

   Dennis Nay
   Glenn County Resource Conservation District/Natural Resources Conservation Service
   132-B Norht Enright Willows, CA 95988
   530 934-4601
   dennis.nay@ca.usda.gov

4. **Project Keywords:**

   Channel Dynamics
   Habitat Restoration, Riparian
   Nonnative Invasive Species

5. **Type of project:**

   Implementation_Pilot

6. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

7. **Topic Area**:

   Non-Native Invasive Species

8. **Type of applicant:**

   Local Agency

9. **Location - GIS coordinates:**

   Latitude: 39.8

   Longitude: -122.3

   Datum:

   Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

   Lower Stony Creek located between the Balck Butte Dam and Interstate 5.

10. **Location - Ecozone:**

    6.1 Stony Creek

11. **Location - County:**

    Glenn, Tehama

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    Yes

    If yes, please list the city: Orland

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    Yes **If yes, please list the tribal lands:** Grindstone Rancheria

14. **Location - Congressional District:**

    3rd

15. **Location:**

    California State Senate District Number: 4th

    California Assembly District Number: 2nd

16. **How many years of funding are you requesting?**

    3

17. **Requested Funds:**
    a) Are your overhead rates different depending on whether funds are state or federal?

Yes

If yes, list the different overhead rates and total requested funds:

State Overhead Rate:		20% of total direct/10% on all subcontractors, negotiated for this contract only
Total State Funds:	$2,944,819	
Federal Overhead Rate:	45% of salaries and wages only	
Total Federal Funds:	$2,813,144	

b) Do you have cost share partners already identified?

Yes

If yes, list partners and amount contributed by each:

Natural Resources Conservation Distrct $21,600

Glenn County $15,000

CERES/Team Arundo del Norte $110,000

CSU, Chico Research Foundation $194,222

Stony Creek Landowner Coalition $32,400

c) Do you have potential cost share partners?

No

d) Are you specifically seeking non-federal cost share funds through this solicitation?

No

If the total non-federal cost share funds requested above does not match the total state funds requested in 17a, please explain the difference:

18. **Is this proposal for next-phase funding of an ongoing project funded by CALFED?**

Yes

If yes, identify project number(s), title(s) and CALFED program (e.g., ERP, Watershed, WUE, Drinking Water):

01-n04 Arundo Donax: Survey and Eradication CALFED - ERP

Have you previously received funding from CALFED for other projects not listed above?

No

19. **Is this proposal for next-phase funding of an ongoing project funded by CVPIA?**

No

Have you previously received funding from CVPIA for other projects not listed above?

No

20. **Is this proposal for next-phase funding of an ongoing project funded by an entity other than CALFED or CVPIA?**

No

Please list suggested reviewers for your proposal. (optional)

Steve Schoenig	**U.S. Dept. of Food and Ag.**	**(916) 654-0768**	**sschoenig@cdfa.ca.gov**
Dennis Heimen	**Regional Water Quality Board**	**(530) 224-4851**	**HEIMAND@rb5r.swrcb.ca.gov**
Matt Kondolf	**U.C. Berkeley**		**GKondolf@aol.com**

21. **Comments:**

Environmental Compliance Checklist

Stony Creek Hydrology and Non-Native Eradication Project

1. **CEQA or NEPA Compliance**
   a) Will this project require compliance with CEQA?

      Yes
   b) Will this project require compliance with NEPA?

      No
   c) If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

      Project will not be located on Federal property.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).** *If not applicable, put "None".*

   CEQA Lead Agency: Glenn County Resource Conservation District
   NEPA Lead Agency (or co-lead:)
   NEPA Co-Lead Agency (if applicable):

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   -Categorical Exemption
   XNegative Declaration or Mitigated Negative Declaration
   -EIR
   -none

   NEPA
   -Categorical Exclusion
   -Environmental Assessment/FONSI
   -EIS
   Xnone

   If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

4. **CEQA/NEPA Process**
   a) Is the CEQA/NEPA process complete?

      No

      If the CEQA/NEPA process is not complete, please describe the dates for completing draft and/or final CEQA/NEPA documents.

      These dates depend upon the timing of the Biological Opinion we anticipate that this will take 9 months to complete. Draft - 3/01/03 Final - 9/01/03

b) If the CEQA/NEPA document has been completed, please list document name(s):

5. **Environmental Permitting and Approvals** (*If a permit is not required, leave both Required? and Obtained? check boxes blank.*)

LOCAL PERMITS AND APPROVALS

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

Scientific Collecting Permit	
CESA Compliance: 2081	Required
CESA Compliance: NCCP	Required
1601/03	Required
CWA 401 certification	Required
Coastal Development Permit	
Reclamation Board Approval	Required
Notification of DPC or BCDC	
Other	

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation	Required
ESA Compliance Section 10 Permit	Required
Rivers and Harbors Act	
CWA 404	Required
Other	

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land. Agency Name: Glenn County and possibily the City of Orland	Required
Permission to access state land. Agency Name:	
Permission to access federal land. Agency Name:	
Permission to access private land. Landowner Name: Multiple	Required

6. **Comments.**

Land Use Checklist

Stony Creek Hydrology and Non-Native Eradication Project

1. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   No

2. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

   Yes

3. **Do the actions in the proposal involve physical changes in the land use?**

   No

   If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

   non-native removal bio-engineered bank stabilization revegetation

4. **Comments.**

Conflict of Interest Checklist

Stony Creek Hydrology and Non-Native Eradication Project

Please list below the full names and organizations of all individuals in the following categories:

- Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.
- Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.
- Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

Donnan Arbuckle, Glenn County Resource Conservation District
Dr. Tomas Griggs, CSU, Chico - College of Natural Sciences
Margie Sawyer, Stony Creek Landowner Coalition
John Carlon, Sacramento River Partners
Susan Sjoberg, Glenn County Department of Education
Vince Minto , Glenn County Planning Department
Richard Holman , CSU, Chico College of Engineering,Computer Science and Technology
Marc Horney , U.C. Cooperative Extension
David Stoffel, Tehama County Ag. Commissioner
Chuck Nelson , CSU, Chico, Geographic Information Center

Subcontractor(s):

Are specific subcontractors identified in this proposal? No

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

If yes, please list the name(s) and organization(s):

Dennis Nay **NRCS**

Vince Minto **Glenn County**

Chuck Nelson **CSU, Chico**

Marc Horney **U.C. Cooperative Extension**

John Carlon **Sac. River Partners**

Ton Griggs **CSU, Chico**

Comments:

John Lowrey from CALFED's Watershed Program and Dennis Bowker toured Stony Creek with Glenn County RCD and County representatives during the month of August.

Budget Summary

Stony Creek Hydrology and Non-Native Eradication Project

Please provide a detailed budget for each year of requested funds, indicating on the form whether the indirect costs are based on the Federal overhead rate, State overhead rate, or are independent of fund source.

Federal Funds

Year 1												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary** ***(per year)***	**Benefits** ***(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	Outreach/Education	6385	105460	33452	3150	14160	12300	0	0	168522.0	47457	215979.00
2	Permitting/Mapping/Non-native Eradication	1982	56226	13433	3000	1900	610860	0	0	685419.0	25302	710721.00
3	HEC Model/Bank Stabilization	692	19500	2340	410	2115	180000	0	0	204365.0	8775	213140.00
4	Restoration/Monitoring	406	16043	2543	1060	1820	20000	6000	0	47466.0	7219	54685.00
5	Admin	437	13999	1680	1680	1488	0	0	0	18847.0	6300	25147.00
		9902	211228.00	53448.00	9300.00	21483.00	823160.00	6000.00	0.00	1124619.00	95053.00	1219672.00

Year 2												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary** ***(per year)***	**Benefits** ***(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	Outreach/Education	2128	35153	11151	1050	4720	4100	0	0	56174.0	15819	71993.00
2	Permitting/Mapping/Non-Native Eradication	1189	33735	8060	1800	1140	366516	0	0	411251.0	15181	426432.00
3	HEC Model/Bank Stabilization	1153	32499	3900	684	3525	300000	0	0	340608.0	14625	355233.00
4	Restoration/Monitoring	811	32086	5086	2120	3640	40000	0	0	82932.0	14439	97371.00
5	Admin	437	13999	1680	1680	1488	0	0	0	18847.0	6300	25147.00
		5718	147472.00	29877.00	7334.00	14513.00	710616.00	0.00	0.00	909812.00	66364.00	976176.00

Year 3												
Task No.	**Task Description**	**Direct Labor Hours**	**Salary** ***(per year)***	**Benefits** ***(per year)***	**Travel**	**Supplies & Expendables**	**Services or Consultants**	**Equipment**	**Other Direct Costs**	**Total Direct Costs**	**Indirect Costs**	**Total Cost**
1	Outreach/Education	2128	35153	11151	1050	4720	4100	0	0	56174.0	15819	71993.00
2	Permitting/Mapping/Non-Native Eradication	793	22490	5373	1200	760	244344	0	0	274167.0	10121	284288.00
3	HEC Model/Bank Stabilization	461	13000	1560	274	1410	120000	0	0	136244.0	5850	142094.00
4	Restoration/Monitoring	811	32086	5086	2120	3640	40000	0	0	82932.0	14439	97371.00
5	Admin	374	12000	1440	1440	1275	0	0	0	16155.0	5400	21555.00
		4567	114729.00	24610.00	6084.00	11805.00	408444.00	0.00	0.00	565672.00	51629.00	617301.00

Grand Total=2813149.00

Comments.
This budget represents the best management practice for Stony Creek. In the event that the project is not able to be funded in its entirety, page 12 of the proposal identifies opportunities for reduced funding.

Budget Justification

Stony Creek Hydrology and Non-Native Eradication Project

Direct Labor Hours. Provide estimated hours proposed for each individual.

Director - Dennis Nay - 393 Project Manager - Rich Holman - 1782 Restoration Manager - Tom Griggs - 1805 Eradication Manager - TBD - 2782 Fluvial Geomorphologist - TBD - 800 Outreach Coordinator - Margie Sawyer - 4680 Outreach Assistant - TBD - 3120 Administrative Assistant - TBD - 1248 Student Assistant - Various - 3576

Salary. Provide estimated rate of compensation proposed for each individual.

Director - 60.00/hr (Match) Project Manager - 52.10/hr Restoration Manager - 40.00/hr Eradication Manager - 30.00/hr Fluvial Geomorphologist - 45.00/hr Outreach Coordinator - 20.00/hr Outreach Assistant - 12.00/hr Administrative Assistant - 12.00/hr Student Assistant - 12.00/hr

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

Director - 0% (MATCH) Project Manager - 12% Restoration Manager - 12% Eradication Manager - 34% Fluvial Geomorphologist - 12% Outreach Coordinator - 37% Outreach Assistant - 37% Administrative Assistant - 12% Student Assistant - 12%

Travel. Provide purpose and estimate costs for all non-local travel.

Personal Vehicle Expense - 18368 (local travel at IRS rate) Vehicle Rental - 750 Air Travel - 0 Lodging and Meals - 2100 Conference Registrations - 1500 Other - 0

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

Supplies - 20500 Printing - 4450 Postage - 1200 Phone/FAX - 4550 Advertising Expense - 10800 Meeting Expense - 6300

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

SHN - Permitting - 75,000 lump sum Kennedy/Jenks - HEC Model - 255,000 lump sum Wuhlfert Surveying - 245,000 lump sum Glenn County Office of Education - 20,500 lump sum Sacramento River Partners - 100,000 lump sum Sole Terra Farms - Eradication - 900,000 ($4500 per day with equipment) UC Cooperative Extension - 171,720 (digital spectroscopy) Bank Stabilization Contractor - 100,000 (estimated construction costs) CSU - GIC Mapping - 75,000 ($25,000 per year including flights)

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

$6000 for computer equipment to facilitate monitoring

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and necessary costs directly associated with specific project oversight.

Task 5 - $71,487 to prepare work plans, timelines, coordination, bid documents and evaluation, and ensure that the project is completed on time and under budget. Costs monitored twice monthly, schedule monitored twice monthly. The Project Manager has significant experience managing projects up to $140 million including the Boeing 777 expansion project as well as the Shasta Dam Temperature Control Device. Both project completed on schedule and under budget.

Other Direct Costs. Provide any other direct costs not already covered.

None

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs.

Typically indirect costs are intended to generally cover costs such as facilities (including the space itself as well as utilities and janitorial services), general administration, insurance, "infrastructure" (for instance, availability of such resources as library holdings and other resources--e.g. access to electronic databases, communication links, computing backbone, and the like), grant and contract management services, cost of advancing funds for projects which pay in arrears and similar costs.

Executive Summary

Stony Creek Hydrology and Non-Native Eradication Project

The specific goal of this program is to increase the carrying capacity of the Stony Creek channel located in Glenn and Tehama Counties. The Glenn County Resource Conservation District is trying to reduce the amount of land being eroded into the stream during the winter months. The objectives of the proposed Stony Creek Watershed Management Program are: · Hire watershed and education coordinators to assist with outreach, · Mapping and eradication of Arundo donax and Tamarisk from Black Butte Reservoir to I-5, · Hydrology modeling to confirm channel capacity, · Revegetation, monitoring and bank stabilization in sections of Lower Stony Creek. · Effectively manage the over-all project The hypothesis of this study is to determine if Arundo donax and Tamarisk is removed from the center of the stream channel will the carrying capacity of the stream will be increased thus reducing the amount of land that erodes on the banks. Native species of woody riparian plants will colonize the space opened by the removal of Arundo donax and Tamarisk clumps. Planting of nursery-grown native riparian plants in the space opened by the removal of Arundo donax and Tamarisk clumps are more effective restoration than natural regeneration. We will select plots in several areas of the stream that will be revegetated. The results of these revegetated areas will be compared against areas where Arundo donax and Tamarisk was removed and not revegetated. Our model is simple: removal of Arundo donax and Tamarisk will result in opportunities for the regeneration of native riparian vegetation. While there are no uncertainties related to the invasiveness of Arundo donax and Tamarisk. There is no substantial information related to the ability of the native vegetation to propagate back into the areas where it has been displaced. This project addresses the following CALFED ERP goals: Goal 5 of the Ecosystem Restoration Program to "Prevent establishment of additional non-native species and reduce the negative biological and economic impacts of established non-native species" Objectives 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."

Proposal

Glenn County Resource Conservation District

Stony Creek Hydrology and Non-Native Eradication Project

Donnan Arbuckle, Glenn County Resource Conservation District
Dr. Tomas Griggs, CSU, Chico - College of Natural Sciences
Margie Sawyer, Stony Creek Landowner Coalition
John Carlon, Sacramento River Partners
Susan Sjoberg, Glenn County Department of Education
Vince Minto , Glenn County Planning Department
Richard Holman , CSU, Chico College of Engineering,Computer Science and Technology
Marc Horney , U.C. Cooperative Extension
David Stoffel, Tehama County Ag. Commissioner
Chuck Nelson , CSU, Chico, Geographic Information Center

A. Project Description

1. Problem

Project location

Stony Creek watershed encompasses approximately 700 square miles and is the second largest tributary of the Sacramento River on the west side of the Sacramento Valley. There are three major impoundments, Black Butte, Stony Gorge and East Park reservoirs. Several problems are unique to Stony Creek from Black Butte Dam downstream to the Sacramento River, and it is a section in this reach that will be the focus of this project. The principal issues of this project are:

- Displacement of native riparian vegetation by invasive exotic weeds
- Accelerated channel erosion and resulting property damage
- Degraded aquatic habitat, including that needed for anadromous and resident fish populations
- Accelerated erosion and channel modifications resulting in increased temperatures and sediment discharges
- A modified hydrology (resulting from Black Butte Dam operations) characterized by punctuated stream flows that impede the system from achieving and has adverse impacts to aquatic life, habitat and channel stability and likely results in accelerated sediment delivery to the Sacramento River.

Previous efforts to address these problems have been unsuccessful, largely due to the complexity of the issues, management limitations within this highly modified system, the large number of landowners involved, and the failure to establish a stable organizational structure that would facilitate a unified, cooperative approach. While it will not be possible to address every problem to the satisfaction of all parties, addressing some of the problems provides substantial opportunity to improve conditions in Stony Creek. This will be accomplished through the completion of several interrelated tasks.

Relevant Reports

Arundo donax and *Tamarisk* are recognized by CALFED as a significant problem in the Stage One Priorities under *Goal 4 - Habitat* as well as *Goal 5 - Non-Native Invasive Species*. These non-natives have had a significant impact throughout the Bay-Delta watershed. *Arundo donax* and *Tamarisk* are "C" listed by the Department of Food and Agriculture. This project supports CALFED *Ecosystem Roundtable Program Strategic Goals*, *1, 2, 5* and *6*. These goals are further developed under Section B, Applicability to CALFED.

The Central Valley Regional Water Quality Control Board's *Watershed Management Initiative* (January 2000) assessment of the Sacramento-Lower Thomes watershed area as one that has, "channel instability conditions which have had an adverse impact on water quality and aquatic habitat". These issues are addressed in the following grant application.

Past Studies

There have been a few past studies conducted in and around the Stony Creek area. The U.S. Department of Agriculture's Soil Conservation Service created a *Watershed Plan and Environmental Assessment* for the Upper Stony Creek Watershed in 1989. This study, although somewhat dated, gives excellent background information about the conditions of the creek and useful historical data.

In 1995, the Forest Service and Bureau of Land Management prepared the *Grindstone Creek Watershed Report*. Grindstone Creek is one of the major tributaries to Stony Creek. This report delivers excellent information about the resource conditions, delving heavily into restoration actions. In 1997 the Forest Service prepared another *Watershed Analysis Report* on Briscoe Creek Watershed. This study has compiled excellent resource condition information that is much more current than the previous study and is more in-depth. In 2001 the State Water Resources Control Board funded Glenn County to produce a *Lower Stony Creek Watershed Study and Stewardship Plan*. This plan is viewed as more of a scoping study than a full watershed plan, as its name suggests and has been an excellent springboard for getting local landowners involved in watershed issues.

Other relevant reports include the *Sacramento and San Joaquin River Basins Comprehensive Study,* Joint Technical Support Group Meetings on Ecosystem Restoration and Flood Damage Reduction on the Sacramento River Watershed held on April 2, 1998. General flooding and related environmental resource problems were addressed. The group discussed the draft general problem statements that were proposed as a result of the previous (March 16) meeting. The following are some of the revised general problem statements:

- The natural hydrologic and geomorphic processes that prevailed on the middle and lower reaches of the Sacramento River have been lost as a result of confining flood flows in reservoirs and between engineered levees. As a result of this loss of natural processes, fish and wildlife habitat has been severely degraded.
- Mitigation for loss of habitat related to protecting (i.e., through the Sacramento River Bank Protection Project) and maintaining the Sacramento River Flood Management System has been inadequate and/or unsuccessful because of perceived potential impacts to the structural integrity of the system (e.g., to levee integrity) and to the level of protection (i.e., capacity) the system provides.
- Invasion by exotic vegetative species threatens the survival of native species and the flow-carrying capacity of the flood management system.

Their recommendations for future projects include the following:

- Use an ecosystem approach to increase riparian, flood basin, and improve riverine and floodplain habitat throughout the Sacramento River Flood Management System.
- Contribute to threatened and endangered species recovery throughout the Flood Management System.
- Contribute to the restoration/rehabilitation of a dynamic system (natural hydrologic, geomorphic processes) to the extent practicable.

These reports collectively support the goal of this proposed program and all of the proposed objectives.

Program Goals and Objectives

Goals

The specific goal of this program is to increase the carrying capacity of the Stony Creek channel in order to reduce the amount of land being eroded into the stream during the winter months.

Objectives

The objectives of the proposed Stony Creek Watershed Management Program are:

- Mapping and eradication of *Arundo donax* and *Tamarisk* from Black Butte Reservoir to I-5,
- Hire watershed and education coordinators to assist with outreach,
- Hydrology modeling (HEC-RAS) to confirm channel capacity,
- Revegetation, monitoring and bank stabilization in sections of Lower Stony Creek.
- Effectively manage the over-all project

Hypothesis

The hypothesis of this study is to determine if *Arundo donax* and *Tamarisk* is removed from the center of the stream channel, will the carrying capacity of the stream be increased thus reducing the amount of land that erodes on the banks due to a lower water surface elevation.

Native species of woody riparian plants will colonize the space opened by the removal of *Arundo donax* and *Tamarisk* clumps.

Planting of nursery-grown native riparian plants in the space opened by the removal of *Arundo donax* and *Tamarisk* clumps are more effective restoration than natural regeneration. We will select plots in several areas of the stream that will be revegetated. The results of these revegetated areas will be compared against areas where *Arundo donax* and *Tamarisk* was removed and not revegetated.

2. Justification

Arundo donax and *Tamarisk* did not evolve in California and the newcomer has no effective competitors in our California streambeds. These dense, fast growing plants quickly choke and kill everything in their path. The

result is vast areas where few other species exist, where there were once hundreds of native plants. Wildlife that depended on the alders, cottonwoods, bays, willows, annuals, and open space lose their habitat and food source. In addition to these adverse effects, *Arundo donax* and *Tamarisk* consume three times more water than native plants, both are extreme fire hazards, and they create serious flood control problems. (California Exotic Pest Plant Council/Team Arundo's, *Arundo donax* Workshop Proceedings)

Conceptual model
Arundo donax and *Tamarisk* occupy space and volume that would otherwise support riparian vegetation and native wildlife. They are of no use to wildlife for cover, foraging, or nesting. Once a clump of *Arundo donax* is established it grows laterally. Both *Arundo* and *Tamarisk* eventually crowd out native species of riparian vegetation, suppressing regeneration of native species. This change in the structure of the vegetation lowers its value to wildlife. Infestations of *Arundo donax* and *Tamarisk* in stream channels will alter channel geomorphology (e.g., Stony Creek) and will cause flow splits and bank erosion.

Our model is simple: removal of *Arundo donax* and *Tamarisk* will result in opportunities for the regeneration of native riparian vegetation. While there are no uncertainties related to the invasiveness of *Arundo donax* and *Tamarisk.* There is no substantial information related to the ability of the native vegetation to propagate back into the areas where it has been displaced. This is the hypothesis that will be tested.

The invasion of *Arundo donax* and *Tamarisk* is responsible for the erosion of the banks on Stony Creek. The massive root mass of the *Arundo* plant traps sediments, eventually creating an island. This island deflects water from itself to the nearby banks. Eventually these banks erode. With the spread of the *Arundo*, the channel has increased in width. In some areas of Stony Creek the banks are over 1 - 1-1/2 miles wide. Hundreds of acres of land have eroded over the past years, threatening homes and other structures. Mapping this area annually will assist us in the Adaptive Management process.

Adaptive Management
Careful monitoring and data gathering will take place prior to removal of *Arundo donax* and *Tamarisk.* At selected locations, based upon channel morphology and substrate texture, the exact position of all native plants in the vicinity of *Arundo donax* and *Tamarisk* clumps will be mapped and photographed for comparison after the removal. In future years, the recovery of the natives will be evaluated and any colonization by seedlings will be documented. Differences in the response of the native species to *Arundo donax* and *Tamarisk* removal should be evident within three years. For each area of the creek we should then be able to evaluate which native species of plants can be self-sustaining and will need management intervention to accomplish restoration.

The lessons learned from the team's Arundo eradication work on Deer Creek in Tehama County provides a significant base of experience that can be applied to Stony Creek. The Arundo eradication on Deer Creek has been ongoing for the past several years. The adaptive management methods developed on Deer Creek will be invaluable to the success of the Stony Creek project.

In accordance with Chapter 2 of the Stage 1 implementation Plan of the Proposal Solicitation Package, we will follow the adaptive management process for this project as follows:

Hypothesis: Invasives *Arundo donax* and *Tamarisk* have displaced native vegetation
Ecosystem Goals and Objectives:
Improve both fish and wildlife habitat by restoring native vegetation through eradication of the *Arundo donax* and *Tamarisk* through the subsequent growth of native riparian vegetation that will support native wildlife.
Specify Conceptual Models:
As stated above, the conceptual model involves choosing selected sites for manually re-vegetating with native species and comparing the success of this restoration with those sites that are left to naturally re-vegetate.

Initiate Restoration Actions:
Upon results obtained from the conceptual model, we will learn which methods and species are more likely to succeed in restoring streams to their native state. As identified in the Stage 1 Implementation Plan, this is part of the learning process that can then be applied on a larger scale to the rest of Stony Creek and other streams where *Arundo donax* and *Tamarisk* has infested and choked native species.

Monitoring:
Monitoring the growth of native species will require time. We will monitor the success of our manual re-vegetation as compared with the natural process. This monitoring effort is the key to evaluation of our hypothesis and will lead us toward our assessment and adaptation. We plan to apply for future funding to continue this effort.

Assess, Evaluate, Adapt
We will choose the stream areas of study based on a variety of reasons. Each of these areas will have a different gradient, flow rate, variance of native vegetation, and impact by humans. Currently there are three main areas. The upper area has a higher level of riparian vegetation and a more narrow stream channel. This area seems like it would respond best to the lowest level of intervention on our part. The middle section has a moderate amount of native habitat however; the stream in this area is wide and braided, making the success of our revegetation somewhat dependent on the availability of a water source and adequate fines in the soils. The lower section is the most inundated with non-natives; we anticipate that this section, in order to show successful revegetation, may require the highest level of intervention. As a result of these differences, we expect to find that each area will yield different results with respect to restoration. We will assess our vegetation plots, evaluate the results and adapt the results as they are obtained. All of these steps are crucial to the adaptive management process that will be utilized in completion of this project.

As is noted in the Stage 1 Implementation plan, demonstration projects will help to determine the practicality or effectiveness of restoration actions, allowing resource managers to evaluate alternative actions or build confidence in the ability of a particular action to achieve an objective. We felt that the needs being addressed in this project provides the justification for the restoration actions proposed. This demonstration project is based on the most current methods of eradication being researched by academic, agency and private industry personnel.

3. Approach

Study design

This project will require the following major components:

1. Mapping - to identify the exact locations of the non-natives and affected landowners
2. Outreach – to educate landowners and to obtain permission to eradicate on their property.
3. Permitting - to obtain the necessary permits prior to commencement of any physical work.
4. Eradication - eradication and removal of *Arundo donax* and *Tamarisk.*
5. Restoration - selected areas will be chosen to test our hypotheses.
6. Monitoring - careful evaluation and comparison of natural restoration to human assisted re-vegetation.

Components 2 (Outreach), 3 (Permitting), 5 (Restoration) and 6 (Monitoring) will be addressed in their respective sections of this proposal as identified in the Proposal Solicitation Package.

Mapping

Using existing map data already gathered by the Geographical Information Center at CSU, Chico, all affected landowners on the stream will be identified. Glenn County will acquire written permission from these landowners to access the creek from their property. Glenn County is currently working on a watershed planning effort funded with a 205j grant from the Regional Water Quality Control Board. Through this grant several landowner outreach meetings have been held. The Project Manager of this proposed project presented the project concept at that meeting. Landowner feedback was very positive.

The most recent aerial photography available for the Black Butte to the Sacramento River section of Stony Creek was flown in October of 1996. Two major flooding incidents have occurred since the 1996 coverage.

Flooding increases the distribution of the *Arundo donax* by transplanting rhizomes to downstream locations. For this reason, the lower section of Stony Creek will show a dramatic increase and spread since the 1996 flight. Therefore, because the information for the lower section is grossly inaccurate, we will be focusing our initial efforts to develop an accurate work plan for the area between Black Butte Dam and the Interstate 5 bridge.

In order to prepare a final site plan, we will be using true color airphotos at the nominal scale of 1"=600'. *Arundo* and other vegetation is clearly distinguishable on photography at this scale. Aerial photography will be digitally scanned images will be geo-referenced to real world coordinates. These geo-referenced orthophoto TIFF images will be interpreted onscreen using ArcView GIS software. Our classification system will be based on the CNPS (California Native Plant Society) vegetation classification system developed by Sawyer and Keeler-Wolf (*A Manual of California Vegetation*). Final mapped data will be referenced with base maps showing various native and non-native habitat types, including *Arundo* concentrations.
Because the information is spatially referenced, it will be possible to digitally monitor the distribution of *Arundo* over time. Up-to-date maps will be prepared on an annual basis (3 times) to evaluate the success, analyze geomorphology, as well to identify additional growth of exotic species in the downstream reach of the stream.

In addition to aerial mapping and digitization, Marc Horney with UC Cooperative Extension will map arundo and tamarisk in Stony Creek using a new multispectral analysis technique for purposes of developing an improved procedure for tracking invasive species. Potential advantages of this new procedure include significant reductions in labor expenses and time invested in generating maps of target plant species, good accuracy and shortened turnaround time. As a component of the Stony Creek restoration project, Horney will acquire 1-meter digital imagery for the 12-mile project site the first and last years of the three-year effort. Using the multispectral analysis technique, Horney and his team will attempt to derive unique classification sets for arundo and tamarisk based on estimates of leaf pigment concentration (chlorophyll, xanthophylls, carotenoids and anthocyanin), leaf inclination angle and canopy density. In 2000 Horney's group successfully derived unique classification sets for arundo in Stony Creek using this method with IKONOS 4 meter satellite imagery. Classification sets will be tested and verified using ground-truthing and airphoto interpretation by other project partners. End products from this effort will includetwo years of raw geo-rectified digital imagery for the site, coverage density, extent of arundo and tamarisk and cover change maps comparing project year 3 to year 1 If successful, a protocol will be published that other eradication and restoration projects could adopt as an alternative mapping method. Estimates of accuracy for this procedure, as well as turn-around time and cost will be reported in comparison to the other standard mapping methods used in this project.

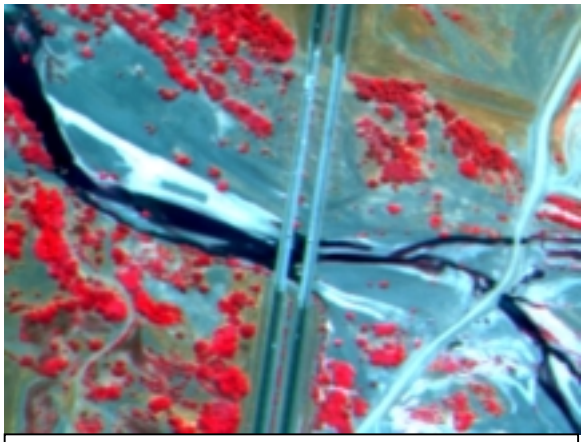


Figure 6. 1 m digital CIR image of Stony Creek at I5

Methods

The project director and the landowners will determine the best manner to address the *Arundo donax* and *Tamarisk* eradication. The project will most likely use private subcontractors (local farmers) and/or agencies such as the County Ag. Commissioner's Office or Conservation crews to do the eradication. Application of herbicides will be performed by a licensed Pest Control Applicator. There will be a high level of landowner involvement in the monitoring and maintenance of the eradication.

There are two methods of eradication commonly used. The first method of eradication utilizes standard broadcast spraying techniques. This method is used only when the *Arundo donax* or the *Tamarisk* is situated in stand-alone clusters and where there are no risks of over-spray to surrounding native vegetation.

The second method involves cutting the reed down to 18" or less, bundling, then hauling the canes to disposal. Common disposal methods include burning onsite or processing for various biomass uses. Toward the end of the peak-growing season, applications of Rodeo® or Stalker® is also applied to any re-growth that occurs dependant upon the proximity to the watershed.

Follow-up treatments are usually necessary within a year of the first eradication. A minimum of three years is needed in order to make a sustained impact on growth. Additionally, on-going monitoring of eradication sites will coincide with our over-all monitoring program (see Monitoring).

To assure sustainability of the eradication work, work done through this project will strongly encourage *Arundo donax* and *Tamarisk* control efforts that:

- Address issues of riparian zone health as a preventive measure against *Arundo donax/Tamarisk* invasion or re-invasion.
- Account for *Arundo donax*'s downstream direction of invasion: ie. "work from the top of the watershed down".

The second portion of this project will involve delineation of test areas to determine the native riparian vegetation species best suited for revegetation and requirements for their propagation in the aggregate-rich/fines depleted soils characteristic of Stony Creek. Approximately three test plots will be planted and three will not with in the same vicinity. The Arbuckle family, the Sawyer family and the Reimer Family all landowners on this stretch of the stream, have agreed to allow access to perform this research. Between these three landowners they own close to 400 acres (2.25 river miles) adjacent to the stream in three different areas. Each test plot will have a different set of parameters including plant type, irrigation, proximity to the stream, soil type, depth of planting, fertilizer and mulch. The goal of this task is to determine the plant species that are most likely to prosper and help stabilize the evolving stream channel in this reach, preventing further erosion of the stream bank. Preventing stream bank erosion protects the existing riparian habitat as well as valuable landowner property. These test plots will be planted in late fall of year 2003, maintained for two years, and evaluated in 2005. It is generally accepted among riparian botanists that at least a three to five-year evaluation and weaning from irrigation is required to effectively conclude which species and conditions will result in a successful revegetation. We will be seeking further funding from the Wildlife Conservation Board and the National Fish and Wildlife Foundation in support of these additional years. Once we have determined through this research the most effective measures for ensuring restoration success, these additional applications will include additional revegetation areas that are in much need of restoration.

Techniques

At locations where the *Arundo donax* and *Tamarisk* are providing apparent bank stabilization, the exotic weeds will be killed and left in the bank to help prevent further erosion. Then, native plants such as willows or oaks will be planted into the dead *Arundo donax* root mass. By the time the *Arundo* rhizomes decompose (approximately 3+ years), the native plants will have grown in size sufficient to maintain the bank-stabilizing effects. In some cases, where the potential erosion jeopardizes a structure, the bank will be stabilized using traditional bio-engineered features.

A method will be established to monitor water surface elevations during high flow periods to help determine the net effect on flow characteristics resulting from the vegetation changes. One of the great advantages of this stretch of the stream is that flow rates are easy to determine based on the releases from Black Butte Reservoir. This will greatly assist in determination of the flood impacts when comparing *Arundo donax* and *Tamarisk* to other native riparian species.

Our approach to the modeling portion of this application includes a hydraulic capacity/performance analysis to identify the Stony Creek channel conveyance limits under several different operational flow scenarios. Kennedy/Jenks Engineers will utilize HEC-RAS, the U.S. Army Corps of Engineers flood profile simulation model, to quantify the capacity of the existing channel and simulate any proposed modifications to channel geometry. To quantify the impacts to existing channel vegetation the flow network model will utilize vertical

and horizontal profiling to estimate sheer stress values. The estimated sheer stress values will be utilized to more accurately predict channel sediment mobility. This model will also provide valuable channel capacity information to assist the Army Corps of Engineers with evaluation of the very erratic releases from Black Butte Dam. In the last five years, numerous events have resulted in dam releases changing in a 24-hour period from less than 300 cfs to more than 10,000 cfs exacerbating the bank erosion issue.

Equipment

Our subcontractors will use various types of equipment for all aspects of this grant application. A New Holland 9030 Tractor with Seppi Hammer Flail Mower with rubber tires will be leased for the three years of this project. These tractors are all wheel drive, articulating and well equipped for the rugged terrain that they would encounter on Stony Creek. There is virtually no ground disturbance by this tire tractor. This is the best solution for the biomass reduction because the flail mower throws the debris to the ground as opposed to competing equipment that may throw debris up to 100 feet from the treatment area. The hammer flail reduces the biomass tremendously. The more times it is re-applied to the *Arundo* cluster, the finer the mulch becomes. This will help to speed up the breakdown of the biomass. The Hydraulic Excavator that will be used is a long reach excavator with a cutter head attached to the boom. This is ideal for cutting along banks with sharp drop-offs and can reach up on the side of hills where rubber tire tractor cannot access. The excavator has a 50-foot reach, which can clear up to a 100-foot swath in a solid stand. The cutter can also be controlled to allow selective cutting around desirable native species. Another advantage to the excavator, as with the New Holland tractor, is the very low ground pressure. We will also use a front loader, with log tines, brush rakes, centrifugal pumps, rotary mulching chippers, haul trailers, survey equipment, GPS equipment, monitoring cameras, and laptop computers for the restoration design and monitoring.

4. Feasibility

This project is being proposed in conjunction with another CALFED funded project. As the project team is in the process of implementing a similar project on Reeds and Red Bank Creeks, this project will just be getting started as that one ends. It is the project teams intent to employ the already trained eradication team for both projects. Our eradication team is lead by a local farmer. This farmer has purchased special equipment to use in eradicating *Arundo donax* and *Tamarisk.* He has also specially trained many of his staff in eradication techniques and herbicide use and has a proven track record on Deer Creek in Tehama County.

This project can be accomplished in the allotted time. The only contingencies would be unforeseen delays in weather, permitting and staffing. Permits will be needed for the Arundo and tamarisk eradication, bank stabilization and revegetation. Permits may be needed from United States Corp Of Engineers 404 or 401, Regional Water Quality Control Board - Water Quality Certification, Department of Fish and Game 1603, a fire district burn permit, an air quality district burn permit, a water district permit as well as permits from the county for grading and the county agricultural commissioner for herbicide application, consultation with the California Department of Water Resource's Reclamation Board may be required in certain circumstances. From our past experience in permitting, delays are common occurrences. The program team will do their best to address all of these delay issues by starting the permit process as soon as possible once the funding has been granted.

In this program there are physical actions, as defined by the PSP. We will be removing *Arundo donax* and *Tamarisk*, conducting bank stabilization and revegetation in several spots on the stream. Landowners on Stony Creek have been active and willing participants in this process. Currently over 19 landowners have signed permission slips granting the project team access to their property if it is needed. Written permission will be gathered as needed from others through out the life of the project by our outreach coordinator. The project director is committed to employing as many of the mitigation measures as outlined in Appendix A to the Record of Decision. Of these measures, 5.3 Water Quality, 5.8 Air Quality, 6.1 Fisheries and Aquatic Species, 6.2 Vegetation and Wildlife, and 7.8 Flood Control all have elements that will be implemented as a part of this program.

Water Quality
Use best construction and drainage management practices to avoid transport of soils and sediments into waterways.
Restore additional riparian vegetation to increase shading of channels and reduce evaporation.
Schedule ground disturbing construction during the dry season.

Air Quality
Limit the hours of operation or amount of equipment
Coordinate prescribed burning programs with relevant air quality management agencies to ensure that the programs are accounted for in air quality management plans.
Encourage use of public transportation and carpooling for construction workers

Fisheries and Aquatic Systems
Limit construction activities to windows of minimal species vulnerability.
Control undesirable non-native species
Schedule ground disturbing construction during the dry season.

Vegetation and Wildlife
Restore wetland and riparian communities and wildlife use areas temporarily disturbed by on-site construction activities.
Restore and enhance important wildlife habitat use areas temporarily Disturbed by on-site construction activities.

Flood Control
Incorporate flood control criteria into the design of streambank revegetation projects.

There are no accounts of any sensitive species using *Arundo donax* or *Tamarisk* as habitat. When endangered species (FWS/NMFS) are involved, the permitting burden can easily stymie our ability to remove non-natives. Nationwide or regional permits would greatly ease the burden on all non-native removal projects. Team Arundo del Norte (TAdN) member Paul Jones (EPA) has approached the San Francisco and Sacramento Corps of Engineers offices about issuing a Nationwide Permit 27 similar to the San Diego office permit for southern California eradication work. TAdN is continuing the push for permits from various agencies to cover *Arundo donax* eradication work in the rest of the state. Once successful TAdN will pass this information on to groups like ours.

5. Performance Measures

Monitoring and Assessment Plans

Glenn County RCD is fully prepared to comply with a Project Monitoring and Eradication Plan to be conducted by our riparian ecologist, Dr. Tom Griggs. Dr. Griggs will seek CALFED or CVPIA approval prior to any data collection. The data collected will be actively used to help determine the effectiveness of our restoration approach. From the results, we will be able to make better-educated judgments about where active restoration is warranted. This data will help guide future decisions on new applications currently being developed. Copies of the Draft Monitoring Data that we have assisted TAdN in developing are included as **Attachment B.** This monitoring data is in the process of being approved by the consulting firm EA Associates. This firm has been hired by CALFED to review and approve all monitoring data and collection. Once these forms are approved it is our intention to use them so that the data we are collecting is consistent in format with the data being collected throughout the state.

The Project Monitoring and Eradication Plan will include:

- Site information, including plan-form drawings showing stream and *Arundo donax/Tamarisk* locations, photos of the site (including aerial), any sensitive species or habitats.
- Geomorphic descriptions of *Arundo donax/Tamarisk* stand locations, including cross-sections of the stream and bank above, below, and within the *Arundo donax/Tamarisk* stands.
- Characteristics of *Arundo donax/Tamarisk* infestation: area and/or linear extent, standard data sheet, and propagate source(s) if known
- Methods for addressing needs of sensitive species and re-vegetation plan.

Much of the monitoring effort will be accomplished using our outreach coordinator, landowners, and some university faculty and students. Prior to cutting the *Arundo donax/Tamarisk*, the locations (latitude and longitude) will be stored in our differential global positioning system (GPS) facilitating the return to the eradication sites for future evaluation. The sites will be evaluated periodically but no less than every four months for eradication success and encroachment or migration of any native species back toward the eradicated areas.

In addition to monitoring eradication site success, this project will collect data of regional strategic importance. Information gathered on potential eradication projects will serve to assess the scope of the *Arundo*

donax/Tamarisk problem regionally and help secure future funding for additional eradication. Collectively, the Eradication and Monitoring Plans will provide Glenn County RCD and CALFED with invaluable information on the distribution, spread, control, and ecological effects of *Arundo donax* and *Tamarisk*, the most invasive riparian weeds in the state. This information will be disseminated to the public and agencies via Team Arundo del Norte's website and work with related projects.

In the CALFED inventory of existing monitoring activities conducted by CALFED's Monitoring and Restoration Program (CMARP), there was no information about Stony Creek found. CALFED believes that "Adaptive management should begin with a concerted effort to integrate existing interdisciplinary experience and scientific information into dynamic models that attempt to make predictions about the impacts of alternative policies". They go on to state that they see adaptive management as fulfilling three primary functions:

- Problem clarification and enhanced communication among scientists, managers, and other stakeholders;
- Policy screening to eliminate options that are most likely incapable of doing much good, because of inadequate scale or type of impact; and
- Identification of key knowledge gaps that make model predictions suspect.

Our program proposes to enhance the level of knowledge that CALFED currently has using the adaptive management functions that they advocate.

Project Performance Evaluation

Hydrology Modeling:
Performance Measure: A completed hydraulic capacity/performance analysis.
Metric: Volume of flow determined by one-foot contours and reasonable cross sections.
Target: A more natural sinusoidal hydrograph
Baseline: 15,000 cfs is the current max release from Black Butte Reservoir

Geomorphic Analysis:
Performance Measure: Measuring the geographic movement of the stream channel
Metric: Annual mapping
Target: to increase our level of knowledge by creating more up-to-date maps
Baseline: 1997 map

Bank Stabilization:
Performance Measure: Identification of high erosion sites.
Metric: reduced erosion
Target: Reduction in size and or width of existing stream channel.
Baseline: 1997 map

Eradication:
Performance Measure: Eradicate *Arundo donax* and *Tamarisk* from Black Butte Dam to the I-5 corridor
Metric: Acres of non-native vegetation
Target: Removal of 7-12 miles of *Arundo donax* and *Tamarisk*
Baseline: Currently there are approximately 24 miles of Arundo donax and Tamarisk in Stony Creek. We are proposing to remove 7-12 miles of these non-natives from Black Butte Dam to the I-5 corridor.

Mapping:
Performance Measure: Completed aerial photography, multispectral plant canopy analysis/comparison of mapping
Metric: Completed maps
Target: Complete photogrammetric maps and automated multispectral analysis alt. years/ begin with year 1
Baseline: Currently the only maps that are available are too old to use for eradication and control planning.

Landowner Education and Outreach:
Performance Measure: Landowner Access permission
Metric: Percent obtained
Target: 100% access
Baseline: 19 landowners currently participating

Project Management:
Performance Measure: On budget, on schedule
Metric: Budget/Timeline
Target: Maintain progress
Baseline: See Timeline and Budget

6. Data

The Glenn County RCD project will be implemented in cooperation with existing eradication projects and through its close association with Team Arundo del Norte. Information and experience will become part of the data clearinghouse being developed by TAdN. This clearinghouse will be web accessible. An annual monitoring report will be submitted at the end of each grant year. We will present findings and address our project's progress through our quarterly reports. All information gleaned from this project will be stored on the State of California Resources Agency server housed at CSU, Chico for the Watershed Funding Database.

7. Products/Outcomes

The project team plans on producing quarterly and final reports as needed by CALFED. The project team is actively involved in several local, region and state organizations where they have been and will continue to be active in making presentations. Locally, the team is involved in making presentations to the Glenn, Tehama, Colusa Weed Management Area, several local RCD's and many City and County officials, including council members and supervisors. The project team has also been active in regional organizations such as Team Arundo del Norte, the Sacramento River Watershed Program, the Regional Council of Rural Counties and the north state ShedHead group. While this team has not conducted any formal workshops on their own, some of their team members were very active in the development and coordination of a large regional permitting workshop intended to assist others trying to accomplish the same types of projects.
It is also our intent to make presentations about our work at the California State Weed Management Area Meeting and at the Annual Riparian Restoration Conference about the work we have done in the past and the results that we found.

The program team has both conducted and been involved in education programs. The team has hosted several meetings with herbicide experts from Monsanto and BASF to meet with local RCD board members, the Tehama County Ag Commissioner, local farmers and others to discuss herbicide application and mix strategies. We also conducted an equipment demonstration for several of these same individuals. It is our intent to hold several more of these education sessions, but to target them towards the effected landowners as well. This proposal has a very strong landowner education and outreach element that is discussed at length in the Local Involvement section.

Our final report will include maps, monitoring and assessment data that compares stream areas that were eradicated to those stream areas that were eradicated and restored. This analysis will include conclusive data that will assist CALFED in achieving the goal of restoring other affected streams to a much healthier state than exists today.

8. Work Schedule

See attached work schedule table at the end of this section. If partially funded, we would reduce the number of streams to be surveyed and eradicated.

Timeline

HEC MODELING/GEOMORPHIC ANALYSIS AND BANK STABILIZATION	
Analyze existing hydrology and historic photos	Nov-02 to Feb-03
Fly area for photogammetry	Mar-03
Digitize and prepare topographical map	Mar-03 to May-03
Prepare preliminary HEC Model	Jun-03 to Aug-03

Analyze HEC Model	Sep-03
Re-run HEC Model without Non-Natives	Oct-03
Analyze annual aerial photos	Ongoing
Design bio-engineering bank stabilization	Oct-03 to Feb-04
Construct bank stabilization	June-04
Analyze geomporphology	Ongoing
Present final analysis	Nov-04
ERADICATION AND MAPPING	
Secure Existing Aerial Photo/Develop Orthophotos	Nov-02 to Feb-03
Develop Flight Plan	Feb-03 to Mar-03
Processing/Develop Orthophotos	Apr-03 to Jul-03
Preliminary Field Surveys	Nov-02 to May-02
Develop Eradication Strategy	Nov-02 to Mar-03
Develop Bid Documents	Apr-03 to May-03
Bid and Award Subcontracts	May-03 to Jul-03
First Year Eradication	Summer, 2003
Second Year Eradication	Summer, 2004
Third Year Eradication	Summer, 2005
RESTORATION AND MONITORING	
Collect, and photograph existing conditions	Nov-02 to Jul-02
Quarterly Monitoring and recording data	On-going
First year eradication monitor	Mar-03 to May-03
Second year eradication monitor	March-02
Select Test Sites for Restoration	Mar-03 to Jun-03
Re-vegetation after 2nd year	Mar-04 to Apr-04
Third year eradication monitor	August-04
Re-vegetation after 3rd year	Mar-05 to Apr-05
LANDOWNER EDUCATION/OUTREACH	
Kickoff Meeting	November-02
Develop Landowner Information Brochure	Nov-02 to Feb-03
Landowner Meetings	Feb-03 to Aug-03
Individual Agreements (as required) ***Teacher Training:***	On-going
Streamside Communities (elementary)	February-02
Watershed Geologic History (middle school)	March-03
Watershed Physics (high school)	March-03
Student Training and Monitoring:	
Elementary (aquatic and terrestrial species)	March 2002- Oct 2005
Middle School (geologic changes)	September 2002-Oct 2005
High School (changes in the physics of the watershed during the restoration process)	September 2002-Oct 2005
PROJECT MANAGEMENT	
Monthly Progress Meetings	Ongoing
Quarterly Reports	Start Jan 1-10
Final Report	Complete 10-31-05

Our budget for this proposal includes monies for Outreach, Education, Environmental Permitting, Mapping, Eradication of Non-Natives, HEC modeling, Bio-engineering Bank Stabilization, Restoration, Monitoring, and Project Management. In the event that this project is partially funded, there are a few options, each with its own consequences:

1. Eliminate HEC model. This task is a standalone task that would define the significance of non-natives in the stream channel from a flood control standpoint. The team's experience is that there are many landowners who are not sold on the habitat issues of *Arundo donax* or *Tamarisk*. This project would provide quantifiable data to allow future projects to address landowners from a flood control perspective. Should the project be partially funded, this is one task that could be sacrificed although we find the data highly significant and not previously researched.
2. Reduce the amount of eradication. The project could reduce its overall objective from 12 miles down to any other significant area.
3. Mapping. The project is planning on mapping the region of work on an annual basis. This could be reduced to project inception and completion however with the dynamics associated with the erratic dam releases, annual mapping overlays provide valuable research information.

Any of the aforementioned items could be reduced, and there should be a reduction in monitoring, mapping, and restoration. Stony Creek is a severely overlooked stream with respect to the flood control issues, fisheries, and wildlife habitat potential.

B. Applicability to CALFED

The watersheds of Glenn County are all within the CALFED management area. Specifically they fall into CALFED's Colusa Basin Ecological Management Unit. This unit is further broken down into four smaller units, Stony, Elder and Thomes Creeks and the Colusa Basin Ecological Management Unit. CALFED has identified seven endangered species that are found in this area, all of which will benefit from a coordinated management effort. They are the lamprey, giant garter snake, native anuran amphibians, native resident fishes, Neotropical migratory birds, waterfowl and various endangered plants and plant communities. The National Wildlife Refuge located in this management area has some of the highest concentrations of giant garter snake in the Central Valley. Efforts to expand this area will be well received. This area is also one of the primary waterfowl and wetland migratory bird wintering areas of the Pacific Flyway. Wetland conservation and enhancement are also highly encouraged. All of the recommendations from CALFED are consistent with and support the goals of this program.

As noted in the CALFED 2002 PSP, these projects meet the restoration priorities for the Sacramento Region. Specifically, *SR-1, to develop and implement habitat management and restoration actions in collaboration with local groups such as the Sacramento River Conservation Area Org*., it is noted in this section that projects for riparian habitat restoration should focus on continued protection and restoration of stream meander corridors between Red Bluff and Colusa. Stony Creek falls with in this area.

Under *SR-2, Restore fish habitat and fish passage particularly for spring-run salmon and steelhead trout and conduct passage studies,* our project will be taking an initial look at the stream corridor, including passage and will be evaluating flow releases from the Black Butte Dam. This project will support "real-time" flow metering to improve the ability to identify, manage and maintain adequate flows.

In *SR-3 Conduct adaptive management experiments in regard to natural and modified flow regimes to promote ecosystem functions or otherwise support restoration actions,* our project falls under two sections, mechanistic models as restoration tools and effects of managed flow fluctuations. Using hydrologic modeling we will be improving the scientific basis for future flow related actions that will greatly improve our ability to justify manipulation of managed flows. We will be using a combination of simulation modeling and physical measurements to evaluate flow and other important fluvial processes. Our restoration plans will be developed in conjunction with the results of the modeling.

Under SR-4, Restore geomorphic processes in stream and riparian corridors, our greater understanding of the relationship between the flows on Stony Creek will improve our immediate and future restoration efforts. Under this section we will be conducting a riparian restoration research project. This project will determine through our Riparian Ecologist Dr. Tom Griggs, the best manner to re-establish the native riparian plants in an area that

has very little native plant life. Dr. Griggs will be using new and existing techniques in trying to re-establish native plant life. These techniques are more fully spell-out in and earlier section of this application.

Under *SR-7, Develop conceptual models to support restoration of river, stream and riparian habitat.* In order for us to develop measures of success, important information exists for more monitoring, better understanding of historic data, as well as greater knowledge of basic processes, populations and communities and stressors. This will allows us to more effectively monitoring the long-term effects of our restoration action. These goals will be accomplished through our comprehensive monitoring program outlined in this proposal under Section 5.a. Monitoring and Assessment Plans.

1. Identification of Stage 1 Priorities/ERP/Science Program/CVPIA Goals

The Draft Stage 1 Implementation Plan identified six areas of scientific uncertainty on which better information and understanding is needed. As noted, the concept of limiting factors is an important aspect of scientific uncertainties. The success of our restoration efforts are ultimately tied to the appropriateness of our management actions that can be assessed on how favorably the native plant species respond to the removal of *Arundo donax* and *Tamarisk.* As the Plan points out, many different factors control plant growth responses under different environmental conditions, and those factors most limiting to the distribution and abundance of populations are usually unknown. Through the funding of this program you will gain a greater level of knowledge of the conditions necessary for successful native plant propagation in an area where native plant growth has been greatly impacted by a huge population of non-natives.

Specifically, this project addresses:
Goal 5 of the Ecosystem Restoration Program to "Prevent establishment of additional non-native species and reduce the negative biological and economic impacts of established non-native species"
Objectives 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 Plan identified Non-native Invasive Species (NIS) as one of the most important issues facing the CALFED Ecosystem Restoration Program. Our goal is to assist in answering questions pertaining to the competitive relationships between native and non-native species and the most effective way to prevent new infestations and manage those that already exist.

These project 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 project addresses the issues (NIS Plan) of leadership, authority and organization, coordination, cooperation and partnership, and education and outreach by providing the following:

- One contract to complete a coordinated modeling, mapping, eradication and monitoring project on one of the most uninvestigated tributaries of the Sacramento River,
- Integration of the best scientific methods for project implementation and monitoring;
- Expertise and information exchange, and
- New information from these interrelated projects, thereby increasing the knowledge of the mechanisms by which *Arundo donax* and *Tamarisk* disrupts the riparian ecosystem.

As with the TAdN project submitted and funded in 1999, the primary objective of this project is to protect remaining native riparian habitat from destruction by the non-native invasive plants, *Arundo donax* and *Tamarisk.* TAdN reports that these alien species are, in some watersheds, possibly the greatest biological threat to dwindling riparian resources. The watershed coordinators in the cooperating watersheds on this project also recognize this threat.

Section 3402 of the CVPIA states that the following goals are consistent with the ERP:
(a) To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins;
(b) To address impacts of the Central Valley Project on fish, wildlife and associated habitats;

(c) To contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay and Sacramento-San Joaquin Delta Estuary;

This project falls under this goal by making significant habitat improvements to a creek that has the ability to provide much needed habitat for fish and wildlife on the Westside of the Central Valley.

One of the main programs of the CVPIA is the Anadromous Fish Restoration Program
Six general objectives need in order for CVPIA to achieve the AFRP goal:

- Improve habitat for all life stages of anadromous fish by providing flows of suitable quality, quantity, and timing, and improved physical habitat;
- Improve survival rates by reducing or eliminating entrainment of juveniles at diversions;
- Improve the opportunity for adult fish to reach their spawning habitats in a timely manner;
- Collect fish population, health, and habitat data to facilitate evaluation of restoration actions;
- Integrate habitat restoration efforts with harvest and hatchery management; and
- Involve partners in the implementation and evaluation of restoration actions.

This program has the ability to start an investigation into the potential for Stony Creek to provide healthy habitat for fish populations. Recently there have been reports of new fish populations in Stony Creek by local Fish and Game authorities. This program will allow us to document and monitor these and other populations more effectively.

The other program central to the success of the CVPIA is the Habitat Restoration Program. The Habitat Restoration Program has two objectives:

- Protect and restore native habitats impacted by the CVP that are not specifically addressed in the Fish and Wildlife Restoration Activities section of the CVPIA.
- Stabilize and improve populations of native species affected by CVP that are not specifically addressed in the Fish and Wildlife Restoration Activities section of the CVPIA. Focus will be given to federally listed, proposed or candidate species, other non-listed State and Federal species of special concern including resident fish and migratory birds.

In a paper prepared by Paul E. Maslin, William R. McKinney and Teri L. Moore, titled *Intermittent Streams as Rearing Habitat for Sacramento River Chinook Salmon*, it is cited that because intermittent tributaries are dry for months at a time, they lack resident populations of large, piscivorous fishes. This is an obvious advantage to juvenile chinook. If less energy is expended on predator avoidance, more will be available for feeding and growth.

They go on to state, however, later in the season (usually in April), adult squawfish move into tributaries to spawn, and may prey on juvenile chinook. Interface predators such as mergansers, egrets, herons, otters, and raccoon's prey on fish in the shallow water of receding streams. The juvenile chinook that enter intermittent streams in early (winter and spring run) and smolt before water levels recede have a better chance of avoiding predators.

They point out that historically; juvenile chinook may have found favorable rearing conditions in shallow, protected backwaters and side channels once characteristic of the Sacramento River (Thompson, 1961). Although a few river reaches remain relatively natural, large sections have been rip-rapped and revegetated for erosion control and irrigation purposes, depleting chinook-rearing habitat. Small, intermittent streams contribute to the overall habitat complexity of the river system, and need to be considered in efforts to protect threatened species.

2. Relationship to other Ecosystem Restoration Projects

Through TAdN's meetings, website, and email listserv, there has already been an increase in coordination and communication. Coordination with others attempting *Arundo donax* control and those studying control methods

and their effects greatly improves the information resources available to this project. The use of the TAdN's newly developed outreach materials and guidance publications is essential to the success of this project. Previous development of these materials will allow Glenn County RCD to concentrate on educating the landowners and actual eradication. Technology and databases that already exist at the UC Davis Information Center for the Environment (ICE), San Francisco Estuary Institute (SFEI), and the California Resources Agency's CERES Program will be utilized to take advantage of work already done.

Eradication of *Arundo donax* and *Tamarisk* in the Bay-Delta area will positively address objectives of other CALFED Common Programs:

CALFED Watershed Workgroup: This program will provide watershed groups with the latest information and expertise on issues involved in *Arundo donax* and *Tamarisk* eradication.

Water Use Efficiency: *Arundo donax* removal will decrease the loss of water through excessive transpiration, as it is a prodigious consumer of water far beyond the normal usage of native vegetation, (Iverson, 1994).

3. Next Phase Funding
This proposal is a "next phase" project. Originally a proposal was submitted under the 2000 PSP to conduct *Arundo donax* eradication on eight north state streams. The proposal was approved, but only to do the first phase of eradication on three streams. This project continues this work and expands upon its scope.

One of the streams that was strategically selected by the Project Team is Red Bank Creek in Tehama County. Red Bank Creek was selected for the first round of funding in order to give the project team experience in dealing with *Tamarisk* eradication. The project team will have completed at least one full year of eradication on this stream before the Stony Creek Proposal is funded. This experience on Red Bank Creek will give us time to experiment with new equipment and herbicide mixes before starting on Stony Creek resulting in some adaptive management experience. We will also be negotiating bulk herbicide purchases in order to benefit all of the streams we are working on.

Currently, the first funded project is still under contract negotiation. We have an October 1, 2001 start date. Once this program is funded we will start on the permitting and landowner outreach. The revised scope of work and current budget are available upon request.

Attachment C provides you with a brief two-page summary of the first phase of this project.

4. Previous CALFED/CVPIA
GCRCD has not received any CALFED funding. One of the project partners, the California State University, Chico, Research Foundation has received prior CALFED funding for various projects (including non-native eradication) on Butte Creek, Deer Creek and Big Chico Creek. They have also received funding to conduct an economic study in Glenn County on potential farmland loss, for riparian mapping along the Sacramento River and for various watershed education projects. The Research Foundation has never received funding from CALFED or any other entity for this specific grant application.

5. System-Wide Benefits
This project will stop the advance of the invasive species *Arundo donax* and *Tamarisk* through direct, intensive eradication in infested sections of selected waterways in the northern Sacramento Valley. It will also coordinate these regional efforts with all *Arundo donax* and *Tamarisk* control projects in the region through a network of expertise, new information, educational materials, and streamlined procedures already developed by TAdN.

C. Qualifications
Project Director:
Dennis Nay is the District Conservationist for the USDA, Natural Resources Conservation Service. Nay graduated from CSU, Chico with a Bachelor of Science in General Agriculture with a specialization in Range Management (with honors). Nay is responsible for technical assistance to private landowners involved with

USDA programs such as the Environmental Quality Incentives Program (EQIP), Wetland Reserve Program (WRP), Conservation Reserve Program (CRP) and Wildlife Habitat Improvement Program (WHIP) in Glenn & Butte Counties. He has served as a Rangeland Management Specialist for the Upper Stony Creek Watershed Program in Glenn County for six years. He works closely with the Glenn County Resource Conservation District, local agencies and organizations to resolve resource problems such as, dairy waste management and orchard pesticide management and water quality problems. Nay has attended Holistic Management Courses conducted by Allen Savory, Ranching for Profit School, conducted by Stan Parsons. Livestock Nutrition Course by Dick Divens. Nay is a Certified Rangeland Manager #44 from the CA Board of Forestry.

Project Manager:
Professor Rich Holman is a faculty member in the Department of Construction Management at California State University, Chico. He is currently working on an *Arundo donax* eradication project on a 3-mile stretch of lower Deer Creek in Tehama County. The project is a three-year test project involving three different methods of eradication and includes monitoring each method and evaluating the results.

Professor Holman is an active participant with the Vina RCD, Big Chico Creek Alliance, and Deer Creek Watershed Project. Mr. Holman has been actively involved with watershed restoration projects since 1994 when he was the project engineer on the $64 million Shasta Dam Temperature Control Device. His vast construction experience is invaluable for "on the ground" implementation of watershed projects.

Restoration Manager:
Dr. Tom Griggs is a Professor in the Department of Biological Sciences at CSU, Chico. Dr. Griggs will be responsible for conducting the majority of the scientific portions of this project. He is currently managing a riparian restoration project for the California Department of Fish and Game at the mouth of Cottonwood Creek in Shasta County. Dr. Griggs is also managing a project for the Department of Water Resources that uses native grasses and sedges to inhibit soil erosion during flood flows at the M&T Flood Relief Structure in Butte County.

Before joining CSU, Dr. Griggs worked for 17 years for The Nature Conservancy of California. From 1988 to 1998 he managed the development of the technology for large-scale (100+ acres) riparian forest restoration at the Cosumnes River and at several sites along the Sacramento River using adaptive management strategies.

Restoration Subcontractor:
Sacramento River Partners is a California non-profit corporation founded in 1998 and based in Chico. Partners are involved with over 3100 acres of riparian lands as restoration specialists, riparian zone consultants, and riparian land managers. Currently Partners has contracts totaling more than $3,500,000 with a variety of federal state, and non-governmental organizations, including U. S. Fish and Wildlife Service, California Department of Fish and Game, and the U.S. Army Corps of Engineers.

Sacramento River Partners has 15 employees. The firm's principals pioneered large-scale restoration in Northern California. The president has extensive experience in both large-scale and family-scale farming. The Vice-President has planted over 1000 acres of trees. Besides the principals, the organization employs 4 biologist/ecologists, and two field managers. The firm's projects range from a 1600-acre restoration plan for a federal refuge to 5 acres of riverbank restoration planted in partnership with a local farmer. The organization is on a sound financial basis with a $100,000 unsecured line of credit and an MBA comptroller.

Hydrologic Modeling Subcontractor:
Kennedy Jenks Consultants has specialized in hydrologic, hydraulic and water resource projects. They have years of experience in hydrology, stormwater management, water resource studies and project implementation. Their specific strengths are in the implementation of river related projects from permitting, funding, design and construction management. They have technical expertise is in computer simulation of hydrologic and hydraulic processes with the use of several software packages, including the Corps of Engineers hydrologic and hydraulic

modeling programs FLO-2D, HEC-1 and HEC-RAS, EPA's SWMM, MODSIM, MODFLOW, WHPA and HSPF. Recent experience includes:

- Watershed Water Resource Model, Carson Water Subconservancy District. As project manager and project hydrologist developed a water resource/rights model on the Upper Carson River Basin (UCRB) that simulated the Carson River, tributaries and the entire irrigation delivery network of canals and ditches.
- River and Irrigation Structure Restoration, Carson Water Subconservancy District. Project manager and designer for the restoration of the diversion structures and river corridor.
- Hydrologic and Hydraulic Technical Services, Carson Truckee Water Conservancy District. Implemented and executed the review and issuance of flood control encroachment permits for over 20 miles of the Truckee River from the California/Nevada state line to the Glendale bridge in the City of Reno.
- Created a hydrologic/hydraulic, HEC-1 and HY-8, models of the contributing watersheds to a proposed detention facility in northern Sun Valley, Nevada..
- Created a hydraulic model, HEC-2, of an urban stream in the City of Susanville, California. Alternatives were investigated to decrease flooding from high intensity storm events that have damaged private and public properties in the past.
- Hydraulic modeling, using HEC-2, was performed to delineate the ordinary high water mark for compliance with Corps Section 404 permit requirements and evaluation of alternatives for the Truckee River Restoration Project, Nevada.

Geographical Information Center (GIC):
The GIC is an applied mapping center located at California State University, Chico specializing in GIS technology. Chuck Nelson has been Director of the Center since it's beginning in 1989. The GIC has had extensive experience mapping riparian vegetation along the Sacramento River, assisting local governments in starting GIS programs and assisting in the mapping needs of the various North State watershed conservancies.

Technical Advisory Committee:
This team consists of Dennis Nay, NRCS, Margie Sawyer, Stony Creek Landowner Coalition, Donnan Arbuckle, and Glenn County Resource Conservation District. Rich Holman, CSU, Chico - Construction Management, Dr. Tom Griggs, CSU, Chico - College of Natural Resources, John Carlon, Sacramento River Partners, Kennedy Jenks Engineering, Sole Terra Farming, Chuck Nelson (CSU, Chico Geographic Information Systems), SHN Engineering and Marc Horney, U.C. Cooperative Extension.

Regional Coordination:
Team Arundo del Norte is a multi-stakeholder partnership dedicated to the reduction and eventual elimination of *Arundo donax*, where it threatens rivers, creeks and wetlands in central and northern California. This Team meets quarterly and communicates actively through an email listserv (tadn@ceres.ca.gov) and an informative website (http://ceres.ca.gov/tadn). The team provides a forum of communication for those conducting current and planned research and eradication projects and for the identification and discussion of issues involved in *Arundo donax* invasion. TAdN will advise on eradication, monitoring, and revegetation methods, help to address permitting issues, and will assist in identifying further opportunities for complementary projects, cooperative agreements, and funding.

Outreach/Education Coordinators:
A local coordinator for the GCRCD will be hired in the first several months of this project. This coordinator's primary responsibility will be to conduct landowner outreach activities in support of the goals and objectives of this program. The coordinator's position will be advertised in several local newspapers. Once qualified applicants are identified, the RCD board of directors, along with the project team, will work together to select a coordinator.

The Glenn County Office of Education has hired Susan Sjorberg as their environmental projects coordinator for their school district. Susan has been working in Glenn County for 3 years primarily with Adopt a Watershed curriculum. Susan has been successful in generating a lot of interest in Stony Creek and watershed processes in general. Many of the teachers she has organized have attended the Lower Stony Creek meetings, giving fantastic presentations about the projects that they were working on with the local area students.

There are no known conflict of interest issues with the Glenn County Resource Conservation District or the Technical Advisory Team.

D. Costs

Cost share

Glenn County Planning Department has indicated its willingness to allocate staff time as needed to this project. Some of their staff time is being compensated for in a new State 204 grant. They estimate that their staff time over the life of this grant will generate approximately **$15,000** worth of cost share for the three years of this grant application. This includes the donation of much needed maps and staff time.

The Stony Creek Landowner Coalition will assist in attending coordinating meetings during the life of this grant. The names and phone number of all the steering committee members can be found under **Attachment D**. All of these landowners have indicated a willingness to participate in a steering committee that will help to guide this project. An estimate of their cost share is **$32,400**. This figure is based on $25.00 an hour, for 5 hours of collaboration per month, 12 months, 3 years. The hourly figure was taken from the cost share hourly wage that RCD directors are at for NRCS projects.

The NRCS has pledged some staff time to this project. Dennis Nay will be the project director for this program. Dennis and the NRCS will not seek direct compensation from CALFED for his involvement. NRCS estimated the value of Dennis's involvement at **$21,615**.

CERES, the California Environmental Resources Evaluation System, has pledged its ongoing web and email listserv administration services worth **$10,000**. CERES technical and systems support for designing the comprehensive *Arundo donax* information system adds a cost-share value as well.

Team Arundo del Norte has also provided all Arundo eradicators with the opportunity to develop monitoring protocols that all eradication projects will be able to use. This will allow us to come up with data that will be congruent with data collected throughout the state. The monitoring protocols were developed under an existing CALFED grant. This task cost over **$100,000**. We will be able to use these forms at no cost to this program.

The CSU, Chico Research Foundation has agreed, for this contract only, to allow us to reduce the normal 20% charge to 10% for the subcontracted portion of this application. This results in a cost savings of **$194,222** if this application is state funded.

There are several items that exist in support of this application that do not fit the definition of "cost share". Several items were federally funded, so we are unable to count them as cost share. They include: existing landowner identification maps, technical support from UC Davis staff time from federally funded grants. Another important item are the commitments from each of the landowners to agree to assist in monitoring the eradication effort. These items are all important to the success of this grant, all have a huge worth to the project, but, under federal guidelines, all cannot count as formal cost share items.

The GCRCD realizes that CALFED has a provision in this application that requires them to formalize the commitment of cost-share funds 30 days after funding notification.

E. Local involvement

Public Outreach Plan

This project application was developed with the support of several local groups, county and city agencies, landowners, and other interested organizations. Many of the local leaders in Glenn and Tehama counties have

been involved in the lengthy process of trying to determine the best course of action for Stony Creek. During 1999-2001 the County, many supervisors, local and regional agency people, environmental organizations, surrounding conservancies and resource conservation districts were involved in the development of the Lower Stony Creek Scoping Study. This study was the springboard for the development of this grant application. Through this study the participants learned that the removal of Arundo and Tamarisk was a primary concern for all of the participants. All of the people involved also agreed that the erratic releases from Black Butte Dam are causing flood and erosion problems. This application intends to keep the momentum that has been built up around this local area focused and moving forward. All of the participants are at the point where they feel that they have discussed the problems at length and collectively they want to see some of the problems addressed. Stony Creek has never had the opportunity to have a program of this magnitude, with this much community support, implemented. This program is the only hope to keeping local leadership interest alive.

Process for notification of landowners

The Outreach Coordinator will be responsible for establishing a process for notifying all landowners in the targeted reach (both directly affected landowners and adjacent landowners). Currently there are 19 landowner permission slips on file allowing the Glenn County RCD access to private property. Through a previously funded grant application to Glenn County, all of the effected landowners will be identified by their parcel number and their proximity to Stony Creek. The outreach coordinator will send by mail a notification of the project, its intent and a name and number for people to call with questions. Some selected landowners will be asked to sign permission slips that allow the RCD to have access to their property for restoration and bank stabilization purposes. Many of these people have already volunteered to sign slips.

The coordinator will be required to make presentations to the Glenn County Board of Supervisors and the Orland City Council once the grant is funded. These presentations will include an overview of the project, a question and answer period and an overview of how these people can participate in the project. Once the participating landowners are identified they too will be notified, individually, by mail of a general meeting that will cover the same subjects. At the end of the grant period these same groups will be convened again, the strengths and weaknesses of the grant will be reviewed and next step processes explored. The coordinator will also be a representative of the Stony Creek watershed organization, required to attend local, regional and state watershed meetings. The general public in Glenn County will be notified through the local newspaper of the first coordinating meeting. There will be a general meeting conducted by the Outreach Coordinator within the first six months of the grant being awarded. At this meeting landowners and other interested parties will have the proposed project explained in detail, questions and concerns will be answered and names and address will be taken for future outreach. Special outreach will be conducted to include local environmental organizations, watershed conservancies, all of the RCD members, and affected landowners.

Education Effort

The current condition of the Stony Creek watershed is still largely unknown to the surrounding community. Through further funding, we would like to offer more extensive education to the teachers currently participating including:

- Adopt-A-Watershed leadership training: this program provides extensive scientific and management training for teams of educators and community support people to ensure the continuation of watershed education in the school and community.
- Further education of the specific variables affecting the Stony Creek watershed, including Black Butte Dam. This would include a guided tour of Stony Creek from its headwaters to the Sacramento River with experts describing the different conditions.
- Further training and resources for the intermediate schoolteachers on the geomorphology of the watershed and creek.

We would also like to offer watershed education programs to the smaller schools in the Stony Creek Watershed. Six schools would benefit from this program that would include:

- Restoration Ecology Curriculum written to the state standards and designed specifically around the issues affecting Stony Creek Watershed. This would be an integrated curriculum implementing State Science Standards.

- Training teachers in this curriculum.
- Purchasing support materials to use in the classroom.
- Provide funding for field studies with students for them to assist in the monitoring of the restoration of the creek by collecting data year to year from Nov 02 to Oct 05.
- Connect teachers with local experts and support people.

The Coordinator will assist teachers in adapting that curriculum to meet their individual needs. The teachers in these rural districts lack funds and supported time needed to help to implement watershed curricula. This grant application will provide funding in support of this effort.

F. Compliance with terms

The Glenn County RCD will comply with the Standard State and Federal contract terms described in the CALFED 2002 PSP Attachments D and E.

G. Literature References

Bell, Gary P. 1997. *Ecology and Management of Arundo Donax and Approaches to Riparian Habitat Restoration in Southern California.*

California Exotic Pest Plant Council. "*Team Arundo donax Workshop Proceedings*", available from the Riverside County Regional Park and Open-Space District, P.O. Box 3507, Riverside, CA 92519-3507. http://ceres.ca.gov/tadn/*Arundo donax*_facts.html

Dudley, Tom L. in press. "*Noxious Wildland Weeds of California: Arundo Donax*". To be published in Noxious Wildland Weeds of California. C. Bossard, J. Randall, & M. Hoshovsky (Eds).

Sawyer, J. and T. Keeler-Wolf, "*A Manual of California Vegetation*". 1995. CNPS Press.

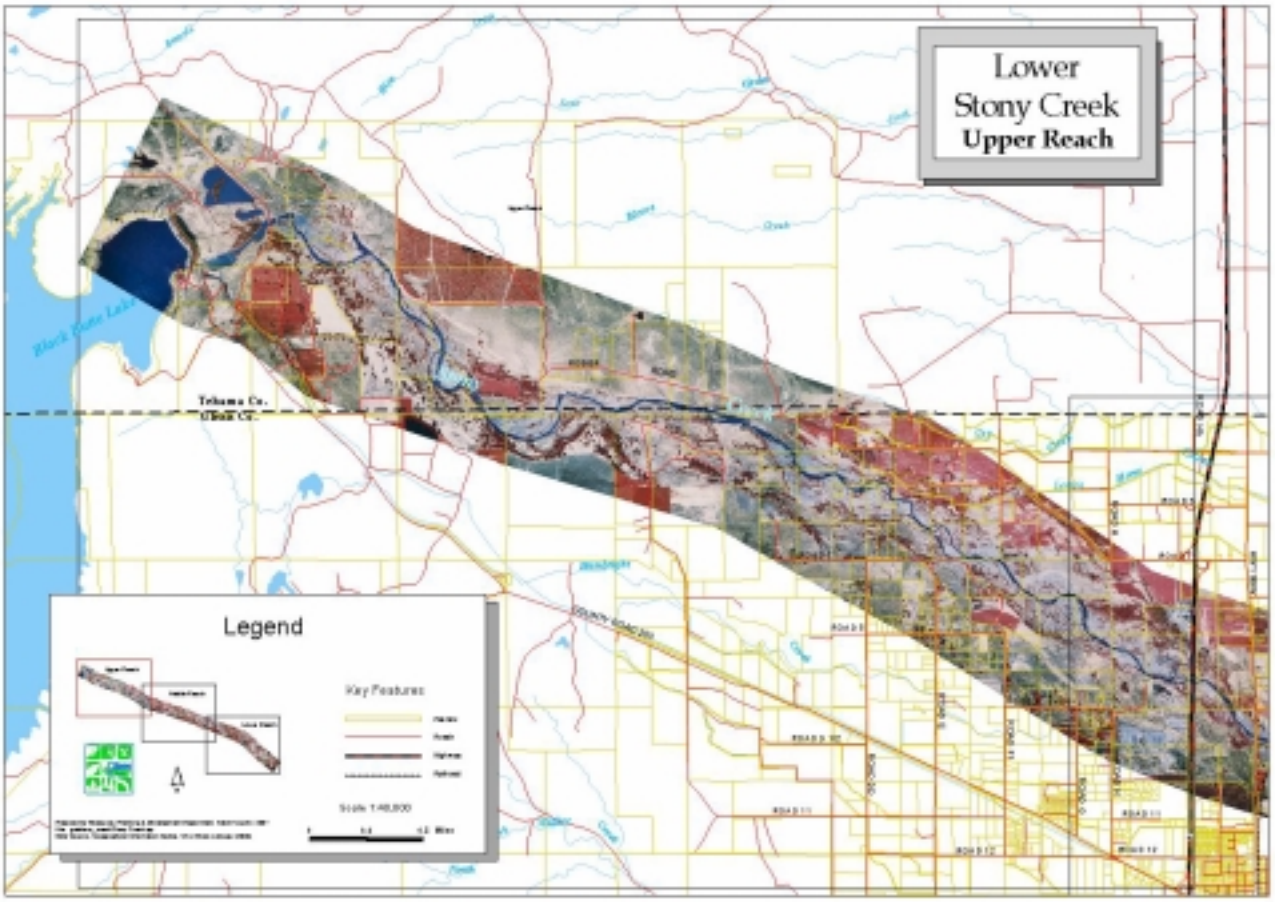
Team Arundo Workshop Proceedings, Riverside, CA – November 19, 1993 - Submitted papers

1. "*Biology and growth habits of giant reed (Arundo donax)*", Gary Bell.
   "*Arundo donax in the Santa Ana River Basin*", Shelton Douthit.
2. "The biological pollution of Arundo donax in river estuaries and beaches", Richard Douce.
3. "*The effects of Arundo donax on flood control and endangered species*", Paul Frandsen and Nelroy Jackson.
4. "*Fire threat from Arundo donax*", Greg Scott.
5. "*The impact of Arundo donax on water resources*", Mark Iverson.
6. "*Control of Arundo donax techniques and pilot project*", Nelroy Jackson.
7. "*Team Arundo: A model for inter-agency cooperation*", Paul Frandsen.
8. "*Section 404 permits: needs and processes*", Michele Waltz
9. "*Wetland mitigation banking in the U.S. Army Corps of Engineers, Los Angeles District*", Fari Tabatabai
10. "*Re-vegetation of riparian habitat: hauling coals to Newcastle*", Gary Bell
11. "*Other invasive non-native plants in CA's wildlands and natural areas*", John Randall.

Attachment A

Map of Lower Stony Creek

From Black Butte Reservoir to the I-5 Bridge



Attachment B

Draft Monitoring Forms

Arundo Eradication Project
Arundo Observation Datasheet

Survey Number: **Site Number:** **GPS Point Number:**

Latitude. decimal degs: **Longitude., decimal degs:**

Length: feet. **Width:** feet. **Height:** ☐<6 feet ☐6-12 feet ☐12-18 feet ☐ > 18 feet

Weed position:
☐Channel ☐Bar ☐Bank
☐High flow channel ☐Floodplain
☐Upland terrace

Vigor:
☐Bright green ☐Mature/faded green ☐Yellowing
☐Browned ☐Looks Dead

Density: ☐ <10% ☐10-25% ☐25-50%
☐50-75% ☐75-100%

Appearance: ☐Sprouting ☐Branching ☐Blooming
☐Dead tips ☐Upright ☐Lying down ☐Last year's flowers

Photo #: **Roll/Media #:**

Growing in: ☐Shade ☐Partial shade ☐Sun

Substrate:
☐ Soil ☐ Sand ☐ Gravel ☐ Cobbles
☐ Boulders

Notes:

Survey Number: **Site Number:** **GPS Point Number:**

Latitude., decimal degs: **Longitude., decimal degs:**

Length: feet. **Width:** feet. **Height:** ☐<6 feet ☐6-12 feet ☐12-18 feet ☐ > 18 feet

Weed position:
☐Channel ☐Bar ☐Bank
☐High flow channel ☐Floodplain
☐Upland terrace

Vigor:
☐Bright green ☐Mature/faded green ☐Yellowing
☐Browned ☐Looks Dead

Density: ☐ <10% ☐10-25% ☐25-50%
☐50-75% ☐75-100%

Appearance: ☐Sprouting ☐Branching ☐Blooming
☐Dead tips ☐Upright ☐Lying down ☐Last year's flowers

Photo #: **Roll/Media #:**

Growing in: ☐Shade ☐Partial shade ☐Sun

Substrate:
☐ Soil ☐ Sand ☐ Gravel ☐ Cobbles
☐ Boulders

Notes:

Survey Number: **Site Number:** **GPS Point Number:**

Latitude., decimal degs: **Longitude., decimal degs:**

Length: feet. **Width:** feet. **Height:** ☐<6 feet ☐6-12 feet ☐12-18 feet ☐ > 18 feet

Weed position:
☐Channel ☐Bar ☐Bank
☐High flow channel ☐Floodplain
☐Upland terrace

Vigor:
☐Bright green ☐Mature/faded green ☐Yellowing
☐Browned ☐Looks Dead

Density: ☐ <10% ☐10-25% ☐25-50%
☐50-75% ☐75-100%

Appearance: ☐Sprouting ☐Branching ☐Blooming
☐Dead tips ☐Upright ☐Lying down ☐Last year's flowers

Photo #: **Roll/Media #:**

Growing in: ☐Shade ☐Partial shade ☐Sun

Substrate:
☐ Soil ☐ Sand ☐ Gravel ☐ Cobbles
☐ Boulders

Notes:

Arundo Eradication Project
Arundo Survey Site Description

Recorder's Name:	A.		
Survey Number:	B.		
Stream Name:	C.		
Site Name:	D.		
Site Number:	E.	F. Map Number:	G.
Site Location Description: *(Ex.: Stream banks fromRiverside Ave. Bridge to Napa Rd).* H.			

PHYSICAL PROPERTIES: *(Check all that apply)*

Water body type:	**Bank Substrates:**	**Channel Form:**
☐ River ☐ Year-round stream ☐ Seasonal stream ☐ Canal or ditch ☐ Slough or oxbow lake ☐ Flood bypass ☐ Vernal pool ☐ Delta/Estuary ☐ Other: _____	☐ Bedrock ☐ Soil ☐ Sand ☐ Gravel ☐ Cobbles ☐ Boulders	☐Single channel, steep sides ☐Single channel, shallow sides ☐Braided Water depth:_____ feet Channel (bankfull) depth: _____feet Channel width: _____feet Floodplain width: _____ feet Riparian corridor width: _____ ☐feet ☐miles

HUMAN PROPERTIES:

Ownership Type:	☐Private ☐County ☐ Federal ☐State
Dominant surrounding landuse:	☐Urban ☐Agriculture ☐Rangeland ☐Park/Preserve ☐ Rural residential
Channel Structures:	☐Bridge ☐Culvert ☐Outfall ☐ Dam ☐Riprap ☐Cemented channel
Notes:	

BIOLOGICAL PROPERTIES:

Dominant vegetation type:	☐ Herbaceous plants/grasses ☐ Mostly shrubs ☐ Mostly trees ☐ Mix of trees and understory
% total veg. cover over site:	☐ 100% | ☐ 75% | ☐ 50% | ☐ 25% | ☐ 10% | ☐ >10%
Notes:	

OTHER SPECIES PRESENT:

SITE OBSERVATION NOTES:

SITE PHOTOS:

Photo #	Media #	Feature/Notes

CHANNEL CROSS-SECTION SKETCHES:

Sketch the shape of the site in cross-section. Include estimates of distances such as across the creek and the depth of the banks on your drawing.

Upstream end	Middle	Downstream end

This form logs information about the overall survey. Fill out this form directly on the computer and save it in a folder together with the associated "Site Description" and "Arundo Observation" forms. Name this file and the folder after your organization and the survey (example: "SEC Arundo Survey 1").

ORGANIZATION NAME:

SURVEY NUMBER: *An identifying number that relates the survey with its Site Descriptions and Arundo Observations. Your first survey can be #1.*

SURVEY DATES:

Beginning Date (M/D/YYYY):		End Date (M/D/YYYY):	

DATA MANAGER CONTACT INFORMATION:

First name:		Last name:		
Address:	Street:	City:	State:CA	Zip Code:
Phone:	( )	Email address:		

SURVEY CREW:
Name(s) of the person(s) collecting the information in the field.

First name:	Last name:
First name:	Last name:
First name:	Last name:
First name:	Last name:

SURVEY PURPOSE:
The reason(s) for this survey.

☐Inventory ☐Eradication planning ☐Follow-up monitoring ☐Ground-truthing

MAP INFORMATION:
A description of the maps used to make observations during the survey.

Title of Map or set of Maps:	
Source of Maps:	
Map Scale:	

NOTES:
Anything you would like to record about the surveyed area.

Attachment C
Phase 1
First Phase Funding
Two-page Summary

Phase 1 contract number is # 01-n04.

Project Description

Team *Arundo* of the Upper Sacramento (TAUS) was formed in response to the threat that *Arundo donax* (giant reed or giant cane) and *Tamarix* (Tamarisk or Salt Cedar) present in the riparian areas and stream ecosystems of northern California. There are two pressing needs regarding *Arundo and Tamarix*: clear identification of where *Arundo* and *Tamarisk* growth starts in the watershed and prompt on-the-ground eradication. TAUS proposes a three-year project. All of the sites are in Tehama County. The project will provide a forum for information exchange and coordination with other groups in the region and will outreach to the landowners affected by these plants. There will be a strong focus on education, specifically, why these non-natives are detrimental to the health of their streams and the methods used to remove them.

TASK 1: PROJECT MANAGEMENT:
TASK 2: MAPPING AND ERADICATION
TASK 3: RESTORATION/MONITORING:
TASK 4: FINAL REPORT

Scientific Merit

Conceptual Model:

*Arundo donax occ*upies space and volume that would otherwise support riparian vegetation and native wildlife. It is of no use to wildlife for cover, foraging, or nesting. Once a clump is established, it grows laterally, eventually crowding out native species of riparian vegetation and suppressing regeneration of native species. This change in the structure of the vegetation lowers its value to wildlife. Infestations of *Arundo donax* in stream channels will alter channel geomorphology (e.g., Stony Creek) and will cause flow splits and bank erosion.

Our model is simple: removal of *Arundo donax* will result in opportunities for the regeneration of native riparian vegetation. While there are no uncertainties related to the invasiveness of *Arundo donax*, there is no substantial information related to the ability of the native vegetation to propagate back into the areas where it has been displaced. This is the hypothesis that will be tested.

Hypotheses Being Tested:

1. Native species of woody riparian plants will colonize the space opened by the removal of *Arundo donax* clumps. The eight creeks in this project are representative of the variety of geologic and hydrologic conditions found in the northern Sacramento Valley. For example, Stony Creek is managed by a flood control dam (Black Butte), while, a few miles to the north, Burch Creek still supports a near natural hydrograph. Reeds Creek and Big Chico Creek both flow through urban areas. Results will, therefore, be representative of most riparian situations found throughout the northern Sacramento Valley.

2. Planting of nursery-grown native riparian plants in the space opened by the removal of *Arundo donax* clumps is more effective restoration than natural regeneration. We will select plots on several streams that will be revegetated. The results of these revegetated areas will be compared against areas where *Arundo donax* was removed and not revegetated.

3. Removal of *Arundo donax* from entire reaches of a creek will change the channel geomorphology and lessen flood damage issues.

Adaptive Management:
Careful monitoring will take place prior to removal of *Arundo donax*. At selected locations, based upon channel morphology and substrate texture, the exact position of all native plants in the vicinity of *Arundo donax* clumps will be mapped and photographed for comparison after the removal. In future years, the recovery of the natives will be evaluated and any colonization by seedlings will be documented. Differences in the response of the native species to *Arundo donax* removal should be evident within 2-3 years. For each creek, with its own unique hydrograph, we should then be able to evaluate which native species of plants can "take care of themselves" and which will need management intervention to accomplish restoration.

Current Status of the Project:
The Phase 1 contract was just signed at the end of September of 2001. No work has been started. The Research Foundation at CSU, Chico is in the process of establishing this contract as a new project.

Existing Data Collection:
No existing data has been collected.

Attachment D
Stony Creek Landowner Coalition
Board of Directors

March 30, 2001

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