

**Southeastern Colorado
Water Conservancy District**

**CWCB/Arkansas Basin Round Table
Grant Application**

May 22, 2007

***Strategic Plan for the Long-Term
Management of Non-Native Phreatophyte
Trees and Mapping Project for the
Arkansas Basin***

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Exhibit A

I. Scope of Work

WATER ACTIVITY NAME: Strategic Plan for the long-Term Management of Non-Native Phreatophyte Trees and Mapping Project for the Arkansas Basin

GRANT RECIPIENT: Southeastern Colorado Water Conservancy District

FUNDING SOURCE: Arkansas Basin Account - \$50,000.00

BACKGROUND

Southeastern Colorado Water Conservancy District (District) is requesting \$50,000 in grant funding to assist in funding the development of a Strategic Plan (Plan) for the long-term management of non-native phreatophyte trees and to finish mapping the Arkansas Basin to inventory the infestation level of these invasive species. The expected total cost of the Project is \$206,554.

Funding for this project is being provided by several sources including the CWCB, Department of Local Affairs grant, Purgatoire River Water Conservation District, West Otero-Timpas Conservation District, Arkansas River Conservation District, Otero County, Crowley County, Bent Count, Prowers County, SECWCD, Bent Conservation District, NRCS, Colorado State Forest Service, CSU Cooperative Extension SE Colorado Region, SE Colorado Resource and Conservation, Lincoln County and Pueblo County.

Monies from the CWCB will be used to help complete a portion of Task 3.

Non-native phreatophytes trees (Tamarisk, Russian olive, and Siberian elm) have infested much of the riparian lands and are moving into the upland areas within the Arkansas River Basin. These invasives are causing serious impacts to our limited water resources. The Tamarisk Coalition has estimated on the main-stem of the Arkansas River the current water losses, above and beyond what native vegetation would use, is 46,600 acre-feet per year. When the water loss from the major tributaries and reservoirs are added an additional 12,000 acre-feet per year is being lost. If this problem is not addressed, future water losses from “infilling” only (no expansion from existing infested areas) are estimated to be 86,000 acre-feet per year on the river and 44,000 acre-feet on the major tributaries and reservoirs. In addition, dense stands of the non-native trees have restricted recreational accessibility, negatively impacted wildlife habitat, and increased the risk for wildfires and flooding.

The planning and mapping project is designed to develop a comprehensive approach on a basin-wide scale, without which control efforts will be largely ineffective. A specific goal is to develop a strategic long-term management plan to efficiently and effectively implement control, riparian restoration, monitoring, and maintenance measures. To compliment the Plan a comprehensive database will be developed that will assist property owners and land managers in determining proper control, restoration, monitoring, and long-term maintenance methods for a particular infestation level and land situation. This

database will be available on a website and it will enable the District and agencies to track the progress of the Plan as it is implemented.

The Tamarisk Coalition, with funding from the Colorado Water Conservation Board (CWCB), the District, and the Purgatoire River Water Conservancy District (PRWCD), recently mapped the lower portion of the main-stem of the Arkansas River and several of the major tributaries. Unfortunately, the mapping project is incomplete because it does not include the upper basin from Pueblo Reservoir west to the headwaters, small reservoirs, lakes and ponds, nor the hundreds of miles of creeks, ephemeral streams, canals, ditches, and dry washes that harbor these thirsty invaders. This type of information is invaluable in determining the total acres of infestation and average density, estimate of current and future water losses, as well as the costs associated with control, revegetation and long-term management.

SUMMARY OF TASKS

The District's goal is to serve in a leadership position overseeing a basin-wide approach to the Tamarisk problem. The six objectives necessary to fulfill this goal are:

1. Develop a plan that encompasses the entire Basin.
2. Perform an inventory of the extent of infestation within the Basin.
3. Implement various types of control measures to remove the invasive species.
4. Restore the native vegetation.
5. Perform monitoring projects to gauge success and increase knowledge.
6. Oversee the long-term management to ensure the problem doesn't rebound.

To assist in the Plan development a Technical Advisory Committee will be created that will consist of mapping and Geographic Information System (GIS) specialists, federal, state and local agencies, weed managers, university staff, Tamarisk Coalition staff, etc. This Committee will assist with identifying the ecological setting of the Basin and gathering information that will be used in the development of the Plan. The information will include mapping and land uses, community input for water resource protection and development, wildlife enhancement, economic and cultural goals, and health and safety issues.

The Plan will need to define alternatives and select a course of action by defining short and long-term goals. The alternatives and goals will be based on federal, state, and local community desires and the existing ecological setting. In addition, ways to provide short, intermediate, and long-term funding alternatives for implementation of the Plan will have to be developed and secured. Funding needs to be consistent and may be available from federal, state, local sources, foundations, taxes, user fees, bonds, incentives, and grants.

Task 1 Project Scoping - Organizing for Plan, Data Base and Mapping Purposes

The project scoping effort will involve selecting and organizing a Technical Advisory Team (Team). Membership of the Team will include: Mapping and GIS specialists, federal, state and local agencies, weed managers, university staff with expertise in invasive species management, and Tamarisk Coalition staff. The Team will provide

recommendations to the District's project manager to help further define and refine the project scope and implementation of the project.

The Team will review existing data and collect additional relevant data including:

- Collect and review current data on phreatophyte occurrence and density within the Arkansas Basin.
- Identify areas where additional phreatophyte inventory data collection is required.
- Collect and review current data regarding public versus private land ownership in areas impacted by phreatophytes.
- Determine the existing ecological setting and gather information pertaining to land-use (agriculture, riparian, open space, etc.), water resource protection and development, health and safety issues (flooding and fire hazards), and wildlife enhancement.

Method/Approach

The Team will conduct four monthly meetings in June, July, August and September 2007 to determine the most effective means to collect and to review the data.

- Mapping data will be collected from the Tamarisk Coalition, federal, state, and local governments, weed managers, and Natural Resource Conservation Service (NRCS) offices.
- Land use data will be collected from the ditch and canal companies, federal, state and local governments and agencies, and NRCS offices.
- Existing ecological setting information will be acquired from Tamarisk Coalition, Universities, Colorado State University, (CSU) Cooperative Extension, ditch and canal companies, federal, state, and local governments and agencies, weed managers, NRCS offices, Division of Wildlife, Conservation Districts, and Water Conservancy Districts.

Deliverable

The data will be reviewed by the Advisory Team and used to create specific recommendations to the District project manager regarding the outline and content of the plan. The Team will provide short and long-term goals for the Plan development as well as funding and implementation strategies.

Task 2 Long-Term Management of Non-Native Phreatophyte Strategic Plan Development

The purpose of the Plan is to provide valuable leadership and tools to initiate a basin-wide effort for the long-term management of non-native phreatophyte trees. The intent is to ensure that selected approaches are consistent, effective, efficient, and that decisions and actions are well documented. The Plan will encourage public land managers and private landowners to undertake coordinated control and restoration measures.

Method/Approach

The Technical Advisory Team will meet on a monthly basis to provide input and direction for the Plan. The Plan will incorporate templates and protocols. The term *template* defines what actions need to be taken, and the term *protocol* defines how the

actions will be performed. The templates and protocols will offer guidelines and criteria for decision making, while carrying out the activities associated with various aspects of the non-native phreatophyte tree control, restoration, monitoring, and long-term management. As the project matures, the templates and protocols will be continuously updated to improve the efficiency and effectiveness of the control, revegetation and rehabilitation, monitoring, and long-term management and maintenance. Long-term objectives will be identified to define measures of success.

Deliverable

The Strategic Plan development will provide tools for a comprehensive approach on a basin-wide scale, without which control efforts will be largely ineffective. The Strategic Plan will enable landowners and land managers to efficiently and effectively implement control, riparian restoration, monitoring, and maintenance measures. It will identify long-term objectives to address infestation levels and define measures of success.

The Strategic Plan will assist the Basin in implementing Governor Owens' 2003 Executive Order and the Department of Natural Resource's *2004 10-year Plan to Control Tamarisk and Restore Riparian Plant Communities in Colorado*. The Strategic Plan will also assist the Basin in taking advantage of the funding source created by the recently passed Federal legislation H.R. 2720, "The Salt Cedar and Russian Olive Control Demonstration Act". In addition, it will support securing funds from new and existing state and federal programs, foundations, and other sources.

Task 3 Interactive Web-based Data Base Development

A comprehensive database will be developed that will assist property owners and land managers in determining proper control, restoration, monitoring, and long-term maintenance methods for a particular infestation level and land situation. This database will be available on a web site and it will enable the District and agencies to track the progress of the Plan as it is implemented. The web site is intended to be the primary means to exchange and share information regarding the Plan as well as monitoring and tracking eradication and restoration efforts.

Method/approach

This task will involve developing the web site and populating the web site with the relevant information from the Plan. Information collected in Tasks 1, 2, 5 and 6, will be formatted to achieve the objectives that meet the goals of the Technical Advisory Team and Project Manager.

Deliverables

Create and format the following for web site display:

1. Inputs for the existing ecological criteria (agriculture, riparian, open space, etc.), water resource protection and development, health and safety issues (flooding and fire hazards), and wildlife enhancement.
2. Inputs defined by the Strategic Plan's templates and protocols for decision making criteria.

3. Web-based display developed for tracking and updating mapping and eradication and restoration efforts.

Website Development:

1. Secure domain name
2. Logo design
3. Website header design
4. Input logos, navigation buttons, header, etc.
5. Develop home page
6. Develop contact page
7. Develop research page
8. Develop funding page
9. Develop GIS/mapping pages
10. Set up access database
11. Generate 325 report pages
12. Develop database login process
 - a. Login
 - b. Failed login
 - c. Lost password page
 - d. Email retrieval processor
 - e. Success email sent
 - f. Log out
 - g. Login processor
 - h. Change password page
 - i. Change password processor
 - j. Create profile
 - k. Create profile processor (writes to database)
13. Develop data entry interface
 - a. Data entry page
 - b. Data entry processor (write to database)
 - c. Delete record
 - d. Delete processor
 - e. Edit record
 - f. Edit processor
 - g. Find record
 - h. Find processor
14. Develop user interface
 - a. 10 decision pages
 - b. 12 control templates
 - c. 8 revegetation templates
 - d. 9 monitoring templates
15. Web-based display developed for formats & protocols for tracking & updating mapping & eradication efforts
 - a. Display & project status for each teams' projects
 - b. Analyze & display proposed treatments for project sub-areas
 - c. Allow multiple teams to coordinate efforts, reducing duplication

16. Consultation
 - a. Conduct approximately 15 progress meetings with project manager
17. Alpha Testing
 - a. Beta and alpha testing of the database during construction and prior to going live
18. UML Database model
 - a. Systems analysis and UML model markup
19. Test Data Entry
 - a. Enter test data for beta and alpha testing
20. Work with staff
 - a. Report generation
 - b. Data entry methods
 - c. Accessing and using the information in the database
21. Software for data base and mapping
 - a. Purchase ESRI software
 - b. Setup for EXRI software hosting
22. Updates to website and mapping
 - a. Website hosting for database and ESRI
 - b. Updates and maintenance of website and database

Task 4 Mapping Project Development

An extremely important element of the project is to map the entire Basin to provide a clear understanding of the extent of the problem. The Tamarisk Coalition, with funding from the CWCB, SECWCD and the PRWCD, recently mapped the lower portion of the main stem of the Arkansas River and several of the major tributaries. Unfortunately, the mapping project is incomplete because it does not include the Basin west of Pueblo Reservoir to the headwaters, small reservoirs, lakes and ponds, nor the thousands of miles of creeks, ephemeral streams, canals, ditches, and dry washes within the Basin. This type of information is invaluable in determining land ownership, the total acres of infestation and average density, estimate of current and future water losses, as well as the costs associated with control, revegetation and long-term management.

Method/Approach

Aerial photography of the Basin will be secured for mapping purposes from NRCS, Tamarisk Coalition and federal, state, and local governments and agencies. It will be followed up by contracting with an on the ground survey crew that will verify GPS coordinates, infestation levels for density, maturity, height, accessibility, presence of native species, and miscellaneous site characteristics. A consultation with the US Geological Survey and National Institute of Invasive Species Science will be performed for technical assistance and data standardization to ensure database compatibility with the national database system (www.niiss.org). A GIS specialist will utilize the field imagery data to draw shapefiles using ArcGIS software. These shapefiles will subsequently be utilized to calculate the total areas of infestation in any specific region.

The data will be analyzed by the Technical Advisory Team and Project Manager to prioritize areas for treatment according to location and health and safety concerns. The

Technical Advisory Team and Project Manager will work closely with NRCS, governments, and others to determine land ownership of infested areas.

Deliverables

The Mapping Project will provide a comprehensive data set for the entire Arkansas Basin. An aerial photograph mapbook for the basin will be available on the website for use. Included will be shapefiles that characterizes each infestation with an attribute table that includes the following fields: percent cover, average height, percent riparian, maturity, accessibility, and other significant species presence. It will feature a digital photo album of the infested areas corresponding to each data point. Interpretive data tables outlining tamarisk infestation characteristics, water loss, and removal / restoration cost estimates for each surveyed section will be developed by the GIS specialist.

It will determine the total acres of infestation, average density, estimate of water losses, and the costs associated with control, revegetation, and long-term management within the entire Basin. The Project will serve as valuable resource tools to assist land owners and land managers in selecting the appropriate control, restoration, management method, and associated costs for a particular level of infestation and land use.

Task 5 Community Outreach/Public Education

The public outreach program will provide education to private land owners and public land managers concerning the contents of the Strategic Plan and to demonstrate how to use the Plan and the web-based database as a resource tool and for tracking purposes.

Method/approach

The Strategic Plan will be posted on the Project's website. As well as being published and 1,000 hard copies will be widely distributed throughout the Basin by local stakeholders (NRCS, federal, state, and local governments and agencies, environmental groups, etc.).

Four informative outreach meetings will be held in April 2008, July 2008, September 2008, and January 2009 to educate others about the Strategic Plan and demonstrate how to use the web-based data base as a resource tool and for tracking purposes. The press will be notified via a release that will provide an overview of the Plan, educational meeting dates, website address, and contact information.

Deliverables

The Strategic Plan will be readily available to all interested parties throughout the Basin utilizing various avenues of access. Outreach meetings will provide details as to the contents and how to utilize the Plan and the web-site database as a tool for implementation and tracking purposes.

Task 6 Long-term Funding Alternatives

Ways to provide short, intermediate, and long-term funding alternatives for implementation of the Plan will be developed and secured. Funding will need to be on

going and may be available from federal, state, local sources, foundations, taxes, user fees, bonds, incentives, and grants.

Method/Approach

A funding page will be developed for the web site that will be periodically updated with funding opportunities that land owners and managers can easily access and pursue. In addition, if the Arkansas Basin is chosen as a Demonstration Site for funding under the federal legislation HR 2720 “Salt Cedar and Russian Olive Control Demonstration Act” SECWCD will become a “pass-through” grantor to eligible projects throughout the Basin.

Deliverables

Various funding opportunities will be accessible on the web site for local governments, land managers, and land owners to pursue in order for them to implement control, restoration, monitoring, and long-term management activities within the Basin.

II. PERSONNEL

PROJECT PARTICIPANTS	ORGANIZATIONS	EXPERTISE
Jean Van Pelt	SECWCD	Arkansas Basin Strategic Plan Project Manager
Bob Hamilton	SECWCD	GIS Mapping Specialist/Tamarisk Coalition Board Member
James Broderick	SECWCD	Project goals and objectives
Kathie Fanning	SECWCD	Finance Manager
PROJECT PARTICIPANTS	ORGANIZATIONS	EXPERTISE
Tim Carlson	Tamarisk Coalition	Plan development, implementation, and mapping experience
Dr. Anna Sher	Denver University & Denver Botanic Garden	Researcher on control and revegetation methods
Dr. Scott Nissen	CSU – Fort Collins	Researcher on control and revegetation methods
Debbie Myers	Bent Conservation District	Bent County Working Partners Project Manager
Shelly Van Landingham	Colo. State Forest Service	Tackling Tamarisk on the Purgatoire Project Manager
Joel Plath	Colo. State Univ. Cooperative Extension	South Central Colo. Regional Director
Bill Long	SECWCD Board President/ Bent County Commissioner	Spearheading regional efforts
Tim Macklin	SE Colo. Resource &	Knowledgeable in funding

	Conservation Development	opportunities and Strategic Plan development
JR Phillips	Fremont County Weed Manager	Upper Arkansas Weed Management Cooperative Partner
Elizabeth Campbell	Pueblo County Weed Manager	Upper Arkansas Weed Management Cooperative Partner
Chris Markuson	Pueblo County GIS Director	Expertise in database development and GIS mapping project management
Jim Carsella	President, Make Mine Magic Web Design	Web site and database design and implementation
Pat Edelman	USGS	Expertise in water quality/quantity monitoring
Dr. Brian Vanden Heuvel	CSU – Pueblo	Tamarisk control/revegetation & water quality/quantity studies
	Contract position	GIS mapping specialist
	Contract positions	Ground survey crew (2 interns)
	Colorado Division of Wildlife	Expertise in wildlife habitat restoration
	North American Weed Management Association	National on-line database of weed mapping standards
	Various County GIS and planning offices	Determine infestation levels and land ownership
	Army Corps of Engineers	Expertise in control/revegetation methods
PROJECT PARTICIPANTS	ORGANIZATIONS	EXPERTISE
	USDA-NRCS SE Colo. offices	Determine infestation levels and land ownership
	Arkansas Valley Ditch Association	Determine infestation levels, land ownership and mapping information

III. BUDGET

Please, see attachments 1 – 5 in attached MS Excel file titled **ARBT budget May 16 2007**- Worksheets titled:

Attachment 1 – Total Expenses and Revenues

Attachment 2 – Labor Costs

Attachment 3 – Other Direct Costs

Attachment 4 – Website and Database Costs

Attachment 5 – In-Kind

IV. SCHEDULE

Deliverable	Methodology	Schedule
Task 1 Organization for Plan, Data Base & Mapping Development		
Organize Technical Advisory Team	Secure commitments from mapping & GIS specialists, federal, state and local agencies, weed managers, University staff, & Tamarisk Coalition staff	June 2007
Conduct meetings to determine the most effective means to collect and to review data	Hold four monthly meetings in June, July, August and Sept. 2007	June – Sept. 2007
Pre-Development by the Technical Advisory Team and SECWCD staff	Determine existing ecological setting & gather information pertaining to: 1. Land use/mapping & ownership 2. Water resource protection 3. Water resource development 4. Wildlife enhancement 5. Economic goals 6. Cultural goals 7. Health issues 8. Safety issues	July – Sept. 2007
Definition of Short and Long Term Goals	Define goals and select course of action to meet goals based on: 1. Federal, state, and local community desires 2. Existing ecological setting	June – Sept. 2007
Deliverable	Methodology	Schedule
Task 2 Plan Development		
Plan Development meetings	Conduct ten monthly Technical Advisory Team meetings for Plan development & review	June 2007 thru March 2008
Plan Development by Technical Advisory Team and SECWCD staff	1. Define templates (what action will be taken) for control actions 2. Define protocols (how the actions will be performed) for control actions	August 2007
Plan Development by Technical Advisory Team and SECWCD staff	1. Define templates for revegetation & rehabilitation actions 2. Define protocols for revegetation & rehabilitation actions	September 2007
Plan Development by	1. Define templates for monitoring	

Technical Advisory Team and SECWCD staff	programs and projects 2. Define protocols for monitoring programs and projects	October 2007
Plan Development by Technical Advisory Team and SECWCD staff	1. Define templates for long-term management actions 2. Define protocols for long-term management actions	November 2007
Plan Development Completed	Consolidate and proof	December 2007
Task 3 Interactive Web-Based Database Development		
Website Development	1. Secure domain name 2. Logo design 3. Website header design 4. Develop home page 5. Develop contact page 6. Develop research page 7. Develop funding page 8. Develop GIS/mapping pages 9. Set up access database	June – Dec. 2007
Develop database	Input existing ecological criteria	August – Sept. 2007
Develop database	Input defined templates and protocols for decision making criteria	September 2007 – February 2008
Deliverables	Methodology	Schedule
Develop web-based project management mapping application	1. Display project status for each teams' projects 2. Analyze and display proposed treatments for project sub-areas 3. Allow multiple teams to coordinate efforts, reducing duplication	August 2007 – March 2008
Data base testing performed	Testing with selected land owners and managers	March – April 2008
Interactive web-based data base completed		May 2008
Task 4 Mapping Project Development		
Secure Aerial photography of Basin for mapping purposes	Collaborate with Tamarisk Coalition, NRCS, counties, and other federal, state and local	June -August 2007

	agencies	
Ground Crew Verification	Contract for on the ground survey of infestation levels	July – Sept. 2007
Mapping Data Analysis	1. Analyze mapping data for density, maturity, height, accessibility, presence of native species, and miscellaneous site characteristics 2. Prioritize areas for health and safety concerns	July – December 2007
Determine Land Ownership	Work with NRCS, county planners, & others to determine land ownership of infested areas	July – December 2007
Mapping Completed		December 2007
Task 5 Community Outreach/Public Education		
Conduct four Educational Outreach Meetings & Workshops	Explain to land owners and managers the Strategic Plan and demonstrate how to use web-based database as a resource tool and for tracking purposes.	May, July, October, December, 2008
Plan publication and distribution	Publication of Plan for Distribution and Promotion – Publish & distribute 1,000 hard copies of the Plan for use by landowners & managers	Publication – February 2008 Distribution - Continually
Deliverables	Methodology	Schedule
Promotion for public education	Promote plan with newspaper press releases	May, July, October, December, 2008
Task 6 Long-Term Funding Development		
Determine funding mechanisms for implementation of the Plan	1. Define short, intermediate, and long term funding alternatives 2. Pursue & secure funding sources	July 2007 - Ongoing
Easy accessibility to funding opportunities	Develop funding page for the web site	August 2007

V. CWCB/WSRA FUNDING FOR SPECIFIED TASKS

The District requests that the \$50,000 in CWCB/ABRT funds will facilitate paying for the objectives listed in Task 3 – Interactive Web-based Database Development. Task 3 has a total cost of \$78,818. The District chose this element because the web site and database will provide valuable resource tools to land owners and managers to utilize the

Strategic Plan for implementation purposes. In addition, it is crucial to the tracking and outreach efforts throughout the Basin.

VI. PAYMENT

The last five percent of the project budget will be withheld until final project documentation is complete. All products, data and information developed as a result of this purchase order must be provided to CWCB in hard copy and electronic format as part of the project documentation.