

A Nomination for the 2005 EPA Targeted Watershed Grant Program

Submitted by Governor Rick Perry, State of Texas

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THE PECOS RIVER ECOSYSTEM PROJECT

A Saltcedar (*Tamarix* spp.) control project to restore water flow, improve water quality, and restore native vegetation on the Texas portion of the Pecos River (HUC 13000000) from the New Mexico/Texas state line through Red Bluff Reservoir (HUC 13070001), through Imperial Reservoir (HUC 13070001), through Lower Pecos River (HUC 13070008) to its confluence with the Rio Grande River just above Amistad Reservoir

Submitted By

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Abstract

The Pecos River Ecosystem Project, a coalition of public agencies, organizations and landowners, began treating saltcedar (*Tamarix* spp.) along the Texas portion of the Pecos River Basin in 1999. Results include 12,767 acres treated along 271 miles of river, over 90% control using helicopter-applied Arsenal™, reduced salt contamination, rapid reestablishment of native plants in treated areas, and up to 28,992 acre-feet of water salvaged annually. Others are using this project as a large-scale waterway restoration model for the Upper Pecos, Rio Grande, Colorado, Canadian and other waterways in Texas, New Mexico, Arizona, Mexico and elsewhere.

Funding is requested to further develop the interventions involved in this project. Specific work includes treating the remaining 147 miles of the Pecos River, burning debris from areas treated previously, streambank stabilization by native vegetation, and expanding outreach efforts. Total project cost is \$1,200,000 with EPA funding of \$900,000 requested and \$300,000 local match.

Project Description

Introduction

Watershed Description, Threats and Impairments: The U. S. Geological Survey (USGS) lists the 926-mile long Pecos River as the 15th longest river in the United States. It originates in Mora County, New Mexico, joins with the Rio Grande River in Texas, and continues to the Gulf of Mexico. International Boundary and Water Commission (IBWC) records indicate it is the largest contributor of water to the Texas portion of the Rio Grande, averaging 11% of the annual streamflow. It also deposits more than 29% of the annual salt loading into Amistad Reservoir. Today, the once mighty Pecos River in Texas resembles a very poor quality creek rather than a river. Changes in river hydrology, destruction of riparian communities, oil and gas exploration, irrigation demands, long and short-term droughts, damming of the river and the desertification of the upland watershed have all had an impact.

According to Dr. Charles Hart, Extension Range Specialist with the Texas Cooperative Extension Service of The Texas A&M University System (TCEX-TAMU) in Far West Texas, saltcedar and other noxious and invasive plant species dominate the riparian systems within the watershed. Along the river, one acre of saltcedar uses between 3 and 5 acre-feet (1 to 1.6 million gallons) of water annually. Saltcedar also takes salt from the groundwater, concentrates the salt in its leaves and then voids them to the ground. The salt reduces native plant populations and eventually ends up in the streamflow.

The Pecos River is the lifeblood of many communities, providing water for irrigation, industry, recreation, groundwater recharge and ecological purposes. It serves as a major water source for the Rio Grande that provides water to hundreds of thousands of residents of the United States and Mexico. Continued deterioration of the Pecos River Basin can have an adverse effect

on water agreements between states and between the United States and Mexico. It can also have an economic impact of billions of dollars to those living and working within the basin and along the Lower Rio Grande River on both sides of the border.

Watershed Plan and Assessments: The Upper Pecos Soil and Water Conservation District No. 213 (UPSWCD) initiated the Pecos River Ecosystem Project (PREP) in 1999 to address the saltcedar issue. It was the first project of its size to attack the saltcedar problem along a major waterway. The initial objectives were to increase efficiency of water delivery to irrigation districts within the Red Bluff Water and Power Control District and improve water quality by decreasing the salinity and other contaminants. The long-term objective is to restore the entire reach of the Pecos River Ecosystem in Texas to a more normal condition by increasing water flow, reducing salinity, restoring native vegetation, and creating an environment conducive to aquatic plant, fish and wildlife habitat development. More than 25 local, state and federal agencies and organizations have helped with PREP. They are listed in the section entitled Consistency with Other Programs.

The project spent just over \$2.5 million from local (10%), state (50%) and federal (40%) sources. Water improvement and irrigation districts provided funding in 1999 and 2000. A legislative appropriation of \$1 million was administered through the Texas Department of Agriculture in 2001 and 2002. In 2003-2004 the Natural Resources Conservation Service (NRCS-EQIP) provided funding (75%) along with the Texas State Brush Control Program (25%). Additional research and monitoring funds were provided by the Rio Grande Basin Initiative (CSREES) and an Environmental Protection Agency (EPA) 319 grant through the Texas State Soil and Water Conservation Board (TSSWCB), both administered by the Texas Water Resources Institute of The Texas A&M University System. During the past two years

EQIP was used to help defray project costs, but most of the remaining acreage to be treated does not qualify for EQIP due to landowner eligibility. Also, EQIP is not the appropriate program for prescribed debris burning as EQIP is a private landowner-based program and the magnitude of this project requires management by a qualified agency such as the Texas Forest Service (TFS).

Through the years the following strategies evolved that others are now using as a model to control saltcedar on waterways in Texas, New Mexico, Arizona, Mexico and elsewhere. They are consistent with the Team Tamarisk Guiding Principles, a federally supported initiative.

- * Develop a coalition of public agencies, organizations and landowners.
- * Initial saltcedar control using helicopter-applied Arsenal™ at established rates.
- * Debris removal program for previously-treated areas using prescribed burning techniques.
- * Streambank stabilization through reestablishment of native vegetation by natural means.
- * Eventual long-term control of saltcedar populations by release of biological insects.

The EPA 319 funded Pecos River Basin Assessment Program (<http://pecosbasin.tamu.edu>) is helping the project establish a research baseline for watershed water quality and quantity. Its outreach efforts on water related issues are directed toward those more directly involved with the project and ties in closely with outreach efforts described in this application that focus on the national and international community. The Assessment Program will develop a watershed protection plan that will guide continued restoration of the Pecos River Basin far into the future.

Proposed Projects

Description and Impact: Two projects will be included. Project 1 will consist of treating untreated areas of saltcedar along the Pecos River and adjacent tributaries. Project 2 will consist of the prescribed burning, debris removal, and streambank stabilization within previously-treated areas along the river. Work will start when funds become available (projected date is January 1,

2006) and will continue for two years. Results are expected to be similar to those described in the section entitled Expected Environmental Outcomes.

Project 1 Detail - Saltcedar Treatment: About 2,000 acres of saltcedar on 147 untreated miles of river plus adjacent tributaries will be treated with Arsenal™ (Imazapyr) herbicide from mid-August to mid-October, 2006. A 24C label for Arsenal™ application on saltcedar for water conservation was previously obtained. Arsenal™ causes the saltcedar to stop growing and slowly die as its nutrient reserves are exhausted. The herbicide is applied in a selective manner, controlling saltcedar, but with little to no effect on desirable plants and wildlife. It provides effective control with low chemical load on the environment. Spray easements will be used to obtain landowner authorization to treat on private land.

The material will be applied by GPS system guided helicopters equipped with specially designed spray booms that can be quickly adjusted to a 45, 30, or 15-foot swath depending on the density and location of the saltcedar. The specially designed nozzles produce a large (1,500-micron) spray droplet minimizing drift. Since the saltcedar plant must be completely covered with herbicide, the larger droplet size and high total spray volume allows for penetration through a thick canopy and also reduces drift. The helicopters fly at 20 – 40 miles per hour, a speed that allows them to navigate the twists and turns of the river. A truck with an overhead landing platform holds fuel, herbicide, surfactant and water. Helicopters refuel and refill within 45 seconds of landing on top of the truck. The herbicide mix consists of 4 pints Arsenal™ and 2 pints surfactant combined with enough water to apply 15 gallons of mix per acre. A variable rate flow meter ensures accurate application of herbicide mix regardless of airspeed.

Project 2 Detail - Prescribed Burning, Debris Removal and Streambank Stabilization: TFS will burn approximately 213 river miles (426 riverbank miles) of previously-treated

saltcedar along the Pecos River to keep dead saltcedar from washing downriver during heavy waterflows and causing damage. The burning will be done on a continuing basis during the two-year period of the grant with approximately one-half of the acreage burned each year. Twelve-foot wide firebreaks will be constructed along the east and west banks of the river. A 10-man burning crew will use drip torches and Terra Torch®, a device for throwing a stream of flaming liquid to initiate rapid ignition during burn-out operations on a wildland fire or during a prescribed fire project (NIFC, 2005). A gel-like substance used as part of the combustible mixture helps the flame hold to the plants for a more thorough burn.

TFS will plan the burns, make landowner contacts and will provide insurance, rights-of-way, needed equipment, crew meals, and will replace any fences that are burned in the process. Local emergency services will be placed on standby and the Texas Commission on Environmental Quality (TCEQ) will be notified before a burn takes place. Most of the area to be burned is remote with little or no population, but burns will be broken into smaller units when necessary to maintain air quality standards. The prescribed fire plan contains a smoke mitigation plan that includes signage for impacted roads or highways.

Streambank stabilization by native vegetation will occur through natural means. Recent experience has shown native plants rapidly colonize in previously-treated areas of the streambank that allows for more sunlight to reach the soil surface. Four-Wing Saltbush, Mesquite, Bermuda grass, Plains Bristle grass, and many other grasses, shrubs and other vegetation have been observed. TCEX and TFS personnel and others will monitor the reestablishment of native vegetation to assure erosion is minimized after treatment and prescribed burning occur. Where necessary, seeding and/or transplanting will occur.

Project Costs and Administration: UPSWCD is the grant applicant and will administer the \$1.2 million project to continue and expand PREP. Of this amount, \$900,000 is requested from the EPA Targeted Watersheds Grant Program and state and local entities will provide the 25% match up to \$300,000.

Project 1 Costs: Costs include treating 2,000 acres of saltcedar by North Star Helicopters (selected by bid process) at a contracted price of \$220 per acre or \$440,000. Of this amount, \$330,000 is requested from the EPA Targeted Watersheds Grant Program and TSSWCB will provide the 25% match up to \$110,000, provided funds are allocated to the state brush control program by the State of Texas in the next biennial budget.

Project 2 Costs: Costs include contracting with TFS to burn approximately 213 river miles (426 river-bank miles) of previously-treated saltcedar along the Pecos River at a contracted price of \$3,000 per river mile or \$639,000. Of this amount \$479,250 is requested from the EPA Targeted Watersheds Grant Program and the 25% match up to \$159,750 will be provided by irrigation districts, water improvement districts, UPSWCD, and others within the region. There is currently a request before the Texas State Legislature for funds to assist with the burning project. If these or other non-federal funds are received, they will be used as the required matching funds for the grant and the commitment of the irrigation districts, water improvement districts, soil and water conservation districts and others will be reduced proportionately.

Project Administration and Outreach Costs: Costs are budgeted at \$121,000. Of this amount, \$90,750 is requested from the EPA Targeted Watersheds Grant Program and UPSWCD will provide 25% in matching funds up to \$30,250. Funds will be used to contract with a Project Coordinator, purchase needed supplies and software including Oracle software required to run the STORET program, provide staff travel to required meetings, provide staff travel within the

River Basin as activities occur, provide project accounting and perform other services as needed. Two field day/on-site workshops, described in the section entitled Outreach, will be conducted. District in-kind matching funds will be used to provide 70% of a District employee's time to make landowner contacts, obtain spray easements, attend meetings and travel on grant related business. The match will also include Board of Directors time and travel and other related costs.

Project Monitoring and Evaluation: Project 1 is scheduled for completion by mid-October, 2006. Project 2 will be conducted over the two-year duration of the grant. The Project Coordinator will monitor the progress of the two projects to keep them on schedule.

TCEX specialists and others will continue to conduct technical evaluations. Grant funds are not requested and their work will not be included as matching funds for this project. PREP is part of the annual and long-range plans of work for the Extension Range Management Program in Far West Texas and much of the evaluation and monitoring are provided through the CSREES and EPA 319 funding mentioned previously.

Water Salvage: The drawdown-recharge method of calculation is used to estimate water use from hourly measurement of diurnal fluctuations of the water table. This method assumes that little evapotranspiration occurs during the nighttime hours and that the period from the low point of the water table during daylight hours to the nighttime high can be used to calculate a recharge rate for the drawdown period. A standardized procedure-analysis software program is used for the calculations. Shallow groundwater monitoring wells installed at two selected sites on the Pecos River provide data on the fluctuation of the groundwater table. Water level loggers measure water levels in the wells on an hourly basis and data are averaged by month and used to estimate total water loss for the month and year. Comparison of data before and after treatment,

and between treated and untreated plots provides an estimate of water salvaged. Additional studies will evaluate the fate of salvaged water after saltcedar control.

Water Quantity and Delivery Efficiency: Streamflow measurements will be taken as water is released at Red Bluff Reservoir and at selected delivery points downriver. Information obtained from project measurements and from USGS water monitoring stations located within the watershed will be used to compare pre-treatment years with post-treatment years while controlling for rainfall, temperature and other variables to determine delivery efficiency.

Water Quality: Water samples will be collected at selected sites along the Pecos River and processed using standardized tests for TDS, TSS and other water quality measurements. Results will be compared using pre-treatment and post-treatment data while controlling for variances in streamflow, temperature fluctuations and other factors affecting water quality.

Percent Mortality Estimates: A minimum of four transects will be read at each selected treatment site along the Pecos River to determine percent mortality of saltcedar by counting live and dead plants along the transects on both sides of the river.

Prescribed Burn Efficiency: This is a fuel (dead saltcedar and debris) reduction burn in areas along the Pecos River previously-treated for saltcedar control. Pre and post-burn assessments of fuel will be made in test plots at selected sites along the river. Native and other plant damage and re-growth will also be evaluated.

Biological Inventories: The Texas Parks and Wildlife Department (TPWD), and TCEQ conduct periodic biological assessments within the watershed and their information will be used to evaluate reestablishment of native species.

Expected Environmental Outcomes: Results through 2004, as reported by Hart, include 271 miles of the Pecos River treated, 12,767 acres of saltcedar treated including adjacent

tributaries, and greater than 90% control applying Arsenal™ herbicide by helicopter. Between 19,328 and 28,992 acre-feet of water are now being salvaged annually. Streamflow has increased, rapid natural reestablishment of native plants is occurring, and wildlife, waterfowl and aquatic life are returning to the river in treated areas. The habitat of the Pecos Pupfish, classified as a threatened or endangered species, in an adjacent tributary has increased. The salt content in the river at Girvin, Texas is now equal to, rather than double, the salt content of the river just below Red Bluff Reservoir, which is 152 miles upstream. This project will increase these outcomes by including previously-untreated areas of the Pecos River, eliminating dead saltcedar and other debris in previously-treated areas and restoring streambank stability through natural reestablishment of the native plant population.

Consistency with Other Programs: Numerous agencies and organizations involved in this project include the Upper Pecos Soil and Water Conservation District No. 213, Texas Cooperative Extension, Texas Agricultural Experiment Station, Texas Department of Agriculture, Natural Resources Conservation Service, Red Bluff Water and Power Control District, 7 Irrigation Districts in Loving, Reeves, Ward and Pecos Counties, Environmental Protection Agency, Pecos River Compact, International Boundary and Water Commission, Bureau of Reclamation, BASF Co., Texas Forest Service, Texas Parks and Wildlife, Texas Water Resources Institute, North Star Helicopters, Texas State Soil and Water Conservation Board, local landowners and others. Many now serve on the project advisory committee.

Outreach Activities

The Pecos River Ecosystem Project has attracted national and international attention. Other groups are adapting this project as a large-scale waterway restoration model for the Upper Pecos, Rio Grande, Colorado, Canadian and other waterways in Texas, New Mexico, Arizona, Mexico and elsewhere.

A project website, <http://pecosbasin.tamu.edu/>, is maintained by Texas Cooperative Extension and will be updated as new information, methods and strategies are developed. Two field day/on-site Saltcedar Control and Watershed Restoration workshops will be conducted. The 2006 workshop will focus on joint efforts between New Mexico and Texas. The 2007 workshop will focus on international efforts. The workshops will feature information gained from this project and will include additional projects featuring chemical, burning, biological and other control methods. Grant funds will be used to pay for promotion, speakers, facilities, and other typical workshop costs.

In addition, Extension specialists, Forest Service personnel, Soil and Water Conservation District personnel, aerial applicators, and others involved with the project will develop reports, news articles, and worksheets describing the project in detail. An existing video describing previous work will be updated and distributed. Information will be presented at seminars and workshops held during meetings of the various agencies and organizations involved with the project, including those held by the EPA.

There is tremendous interest in the western United States and in other countries regarding successful saltcedar control projects. Every effort will be made to keep both the general public and those in a position to implement similar projects informed about the methods used, problems encountered, and results obtained by the Pecos River Ecosystem Project.

Table 1. BUDGET INFORMATION – PECOS RIVER ECOSYSTEM PROJECT

SECTION A - BUDGET SUMMARY					
Watershed Project, Activity or Work Plan Element	Federal		Non-Federal		Total
1. Project 1-Saltcedar Treatment	\$330,000		\$110,000		\$ 440,000
2. Project 2-Prescribed Burn	479,250		159,750		\$ 639,000
3. Project Administration/Outreach	90,750		30,250		\$ 121,000
4.					
Totals	\$900,000		\$300,000		\$1,200,000
SECTION B - BUDGET CATEGORIES					
Budget Categories	Watershed Project, Activity or Work Plan Element				Total
	(1) Treatment	(2) Burn	(3) Admin	(4)	
a. Personnel	\$	\$	\$	\$	\$
b. Fringe Benefits					
c. Travel			6,000		6,000
d. Equipment					
e. Supplies			3,000		3,000
f. Contractual	440,000	639,000	60,000		1,139,000
g. Construction					
h. Other - Outreach			20,000		20,000
i. Total Direct Charges (sum line a-h)	440,000	639,000	89,000		1,168,000
j. Indirect Charges			32,000		32,000
TOTALS (sum line i-j)	\$440,000	\$639,000	\$121,000	\$	\$1,200,000

Appendix A - Experience in Grant Management

UPSWCD will administer the project and serve as fiscal agent. Grant experience includes a one million-dollar appropriation for PREP from the Texas State Legislature and several smaller grants from the Texas Water Development Board, NRCS and others.

Larry A. Brown, Ph.D. will serve as Project Coordinator. He has managed millions of dollars worth of grants while working with the NMSU Cooperative Extension Service, National 4-H Council in Washington, D.C., TAMU Cooperative Extension Service, Irrigation and Water Improvement Districts in West Texas, and others. Funding sources include USDA-Reclamation, Texas Water Development Board, US-DOL, USDA-CSREES, TAMU, several foundations, and others.

Charles R. Hart, Ph.D. is Associate Professor and Extension Range Specialist with the TAMU Cooperative Extension Service, Far West District. He also worked as a Regional Range Specialist and Extension Agent in Colorado and has extensive range management and brush control experience. He serves as an advisor to the Pecos River Ecosystem Project and will provide Extension leadership to the saltcedar treatment described in Project 1, and to the research and evaluation component for Project 1 and Project 2.

Bill Davis is Regional Fire Coordinator with the Texas Forest Service and has extensive experience in conducting prescribed burns. He serves as an advisor to the Pecos River Ecosystem Project, will oversee the prescribed burn operation described in Project 2, and will assist with the research and evaluation component for this project.