

# Arizona Water Protection Fund Commission



Annual Report  
1998-1999

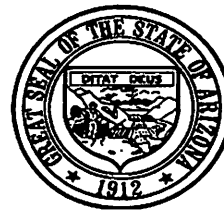
# ARIZONA WATER PROTECTION FUND COMMISSION

## ARIZONA DEPARTMENT OF WATER RESOURCES

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JANE DEE HULL  
Governor

RITA P. PEARSON  
Director

Honorable Jane Dee Hull  
Governor of Arizona, and

Honorable Members  
Arizona State Legislature

I am pleased to submit to you the Fiscal Year 1999 Annual Report of the Arizona Water Protection Fund Commission. This report provides an overview of program accomplishments from July 1, 1998 through June 30, 1999.

This was the fourth year of our statewide public grants program for rivers and streams restoration, maintenance and enhancement. The Commission continued to hold its business meetings around the state to encourage local and regional feedback. Also during this year, the Commission responded to public requests by initiating planning for its first annual conference to facilitate the transfer of information between people interested in Arizona riparian restoration.

In fulfilling its main statutory directive, the Commission continued its function of awarding grants through a public application process for river and riparian related projects. The FY 1999 cycle resulted in the award of 21 grants for \$2.6 million. During the previous three grant cycles, the Commission awarded a total of 72 grants for a total of \$17.3 million. Grants have been awarded in every county of the State.

The Commission is proud to oversee this important function for the State of Arizona. Please contact me at (602) 248-8482 if I can answer any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Roger S. Manning".

Roger S. Manning,  
Chair

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## **Background**

In 1994, the Arizona Legislature established the Arizona Water Protection Fund. The purpose of the Fund is to provide monies to the public through a grant process for the implementation of projects to maintain, enhance and restore rivers and streams and associated riparian resources. This includes fish and wildlife that are dependent on these important habitats.

The Fund, by statute, is suppose to provide \$5 million annually in grants for projects benefiting rivers and riparian habitat. Any individual or entity, state or federal agency, or political subdivision of Arizona may submit an application for an Arizona Water Protection Fund grant. All projects must be located in Arizona, be consistent with state water law, and respond to the overall goals of the legislation.

The Arizona Water Protection Fund Commission, which oversees the Fund, is comprised of 15 citizen voting members and four non-voting members. The 15 voting members represent a diversity of interests and are appointed by various government entities to serve staggered 3-year terms (Table 1).

The Arizona Department of Water Resources provides staff and administrative support to the Commission. The Commission also provides funding to the Arizona State Land Department for a staff position that assists the Natural Resource Conservation Districts with grant applications and acts as a special liaison to the Commission.

## **Statement of Problem**

Rivers, streams and wetlands are important resources to the people of Arizona. Humans have been using and changing these resources for centuries. And through these centuries, we have learned that proper land and watershed management can make a profound difference in the health of our rivers and wetlands.

There is also an increasing awareness that healthy waterways and their associated riparian areas have economic value. Economic benefits take many forms including ecotourism, recreation, streambank stabilization, fish and wildlife habitat, water quality improvement, groundwater recharge, water storage in streambanks which maintains stream base flows, and food sources for pollinators and insectivores. In addition, real estate that is located on the edge of a riparian area often benefits economically from the area's aesthetic and natural values.

Consider the cost avoidance benefits of flood damage that a healthy riparian area can produce. Barren streambanks will erode quickly during a flood event and can result in the loss of acres of land and topsoil. More than 10,000 acres of land were lost to erosion due to high flood flows in 1993.<sup>1</sup> Soil erosion contributes to siltation in our reservoirs, resulting in loss of water storage capacity and increased dredging costs. In other cases, increased erosion causes deposition downstream, raising the stream bottom and increasing the threat of floods to adjacent developed lands.

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<sup>1</sup> Arizona Game and Fish Department, Statewide Riparian Inventory Database, 1996.



Riparian restoration is valued by the public. But the more degraded a system becomes, the more expensive it is to restore. Take, for instance, the case of the Rio Salado (Salt River) restoration through Mesa, Tempe and Phoenix. The cost of reconstructing this area has been estimated at \$84 million. In Tucson, restoration of a portion of Rillito Basin has been estimated to cost between \$25 million to \$35 million and restoration of a 6-mile reach of the Santa Cruz River to cost \$40 million.

**Table 1. Arizona Water Protection Fund Commissioners**

<b>Commission Member Name</b>	<b>Affiliation/Expertise</b>	<b>Term Expires</b>	<b>Appointing Authority</b>
Adams, Lynda	Member of Public – Hydrologist	2001	Governor
Brick, Paul	Natural Resource Conservation Districts	2001	Governor
Beyer, William	Member of Public - Engineer	2000	Senate President
Brandt, Frank	Environmental Organization w/ riparian expertise– Northern Arizona Audubon	1998	Governor
Eddy, Daniel	Indian Tribe – Colorado River Indian Tribes	1999	InterTribal Council
Hartdegen, Jim**	Industrial Water User & CAP Subcontractor – Cyprus Climax Metals	1999	Governor
Keane, John	Agricultural Improvement District w/ Natural Resource Expertise – SRP	1999	Governor
Kirchner, David	Public – Hydrogeologist	2001	Senate President
Koppinger, Doug	Municipality w/ CAP Subcontract & County w/ >500,000 & <1.2 million population – City of Tucson	1999	Senate President
Laurenzi, Andy	Environmental Organization w/ Riparian Expertise – The Nature Conservancy	2000	Governor
Manning, Roger S.*	Municipality w/ CAP Subcontract & County w/ >1.2 million population – Arizona Municipal Water Users Association	2000	Governor
Newman, John	Multi-County Water Conservation District – Central Arizona Water Conservation District	2000	District's Board
Orme, Paul	Agriculture – Orme Ranch	2000	House Speaker
Perales, Henry	Municipality w/CAP Subcontract and County w/ <500,000 population	1999	House Speaker
Smallhouse, John	Member of Public – Range Conservation	2001	Senate President
* Commission Chair			
**Commission Vice-Chair			

## **Philosophy**

The Fund is intended to be a proactive response to possible federal intervention in Arizona's stream and riparian resource issues. The Fund was created to address river and riparian associated issues in a proactive way, through the use of incentives emphasizing local implementation rather than regulation.

The Fund's statutes and operation are based on a "bottom-up" rather than a "top-down" approach. The Fund is a public granting program that asks the public to propose local riparian solutions, rather than having the state dictate specific measures, priorities or areas of concern.

## **The Grant Application Process**

The Commission accepts grant applications annually. Applications are made available for public review and comment for 45 days after the application deadline. Commission staff conducts a technical review of the projects and ranks them according to a system created by the Commission. A brief summary of the technical review is provided to the Commissioners and the applicant. Applicants are then given an opportunity to make an oral presentation to the Commission about their project. During this presentation, the applicant may address any issues, omissions or misinterpretations of information raised during the review process. Commissioners take all this information into consideration but use their own additional criteria and judgment to select projects. Funding decisions occur approximately four months after the application deadline. Projects will be funded upon receiving a majority vote of the Commission members present at the time of voting.

Grants are implemented through contracting with the grantees. Grants can extend over a three year period. Funds are paid out over the term of the contract as activities are accomplished.

## **Accomplishments**

In fiscal year 1999, the Commission funded 21 of the 34 grant applications received, for a total of \$2.6 million. Over its four grant cycles, the Commission has awarded a total of 93 grants, totaling close to \$17 ½ million and ranging in amounts from \$7,390 to \$2,562,000. Of the grants awarded, some were unable to be brought to contract and those monies reverted to the Fund.

Grants have been awarded in every county of the State. The Commission has funded a wide range of projects including channel restoration, riparian revegetation, wetland restoration, wetland creation, watershed management plans, applied research, fencing and grazing improvements, and erosion control projects.

Even though some available funds were not awarded last year, the Commission believes it is more due to the youth of the program rather than a lack of good projects to be accomplished in the State. The Commission expects that the number and requested funding for good projects will continue to grow.

## Accomplishments

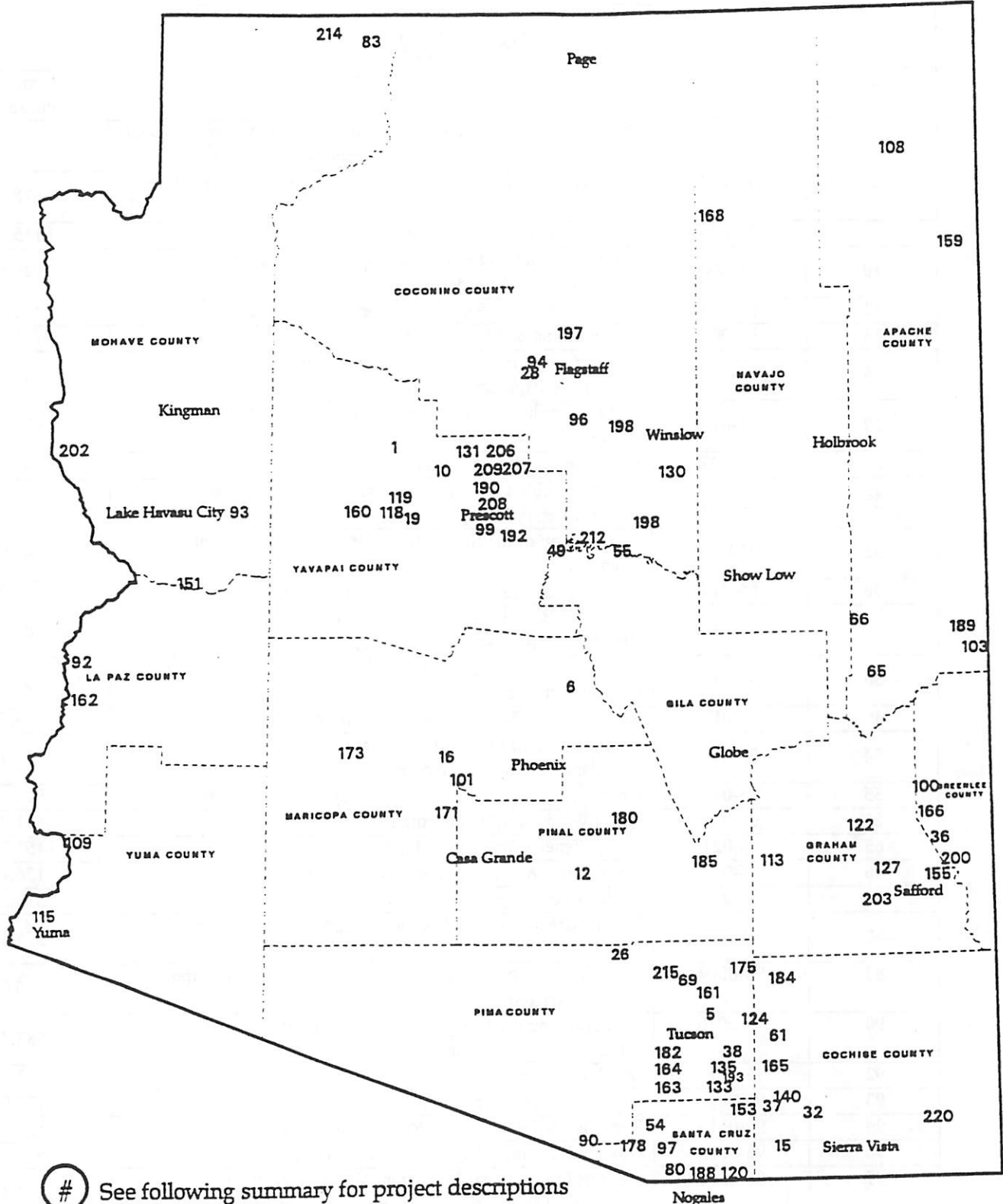
As a result of the 1998 Triennial Public Input Process the Commission initiated planning for its first annual Information Transfer Forum. Public input indicated a desire to have a forum for current informational exchange concerning what methods work for riparian restoration, maintenance and enhancement of streams and riparian habitat and what does not work. The Commission mailed out a survey regarding the Information Transfer Forum. About 150 people responded as summarized in the adjacent box.

### 1<sup>st</sup> Annual Arizona Water Protection Fund Information Transfer Forum Survey Responses

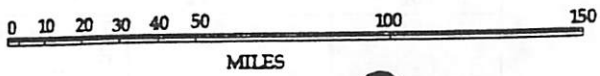
1. **Respondents:** about 150
2. **Number of people who might attend:** approximately 300
3. **Preferred Meeting Location:** Phoenix
4. **Preferred Meeting Date:** February or March
5. **Topics that would be of interest for small group discussions:**
  - Revegetation success
  - Enhancing wildlife habitat
  - Created wetlands
  - Creating partnerships
  - Community involvement
  - Monitoring
  - Erosion control
  - Range management practices
  - Project planning

# Figure 1. Arizona Water Protection Fund Project Locations

August 18 1999



# See following summary for project descriptions





**Table 2.  
Map Key**

Map #	Project #	Project Title	Grant Amount
1	95-001	Stable Isotope Assessment of Groundwater and Surface Water Interaction – Application to the Verde River Headwaters	\$21,508
5	95-002	Partnership for Riparian Conservation in Northeastern Pima County	\$78,100
6	95-003	Sycamore Creek Riparian Management Area	\$115,522
10	95-004	Road Reclamation to Improve Riparian Habitat Along the Hassayampa and Verde Rivers	\$45,693
12	95-008	Picacho Reservoir Riparian Enhancement Project	\$2,400,000
15	95-009	Regeneration and Survivorship of Arizona Sycamore	\$34,617
16	95-010	Assessment of the Role of Effluent Dominated Rivers in Supporting Riparian Functions	\$46,750
19	95-012	The Comprehensive Plan for the Watson Woods Riparian Preserve	\$33,267
26	95-007	High Plains Effluent Recharge Project	\$189,000
28	95-006	Riparian Habitat Restoration Along a Perennial Reach of a Verde River Tributary	\$102,535
32	95-005	Preservation of the San Pedro River Utilizing Effluent Recharge	\$2,562,000
36	95-014	Gila Box Riparian and Water Quality Improvement Project	\$157,223
37	95-015	San Pedro Riparian National Conservation Area Watershed Rehabilitation/ Restoration Project	\$286,000
38	95-016	Refinement of Geologic Model, Lower Cienega Basin, Pima County, Arizona	\$7,390
49	95-017	Restoration of Fossil Creek Riparian Ecosystem	\$59,693
54	95-018	Autecology and Restoration of <i>Sporobolus Wrightii</i> Riparian Grasslands in Southern Arizona	\$53,743
55	95-019	Quantifying Anti-Erosion Traits of Streambank Graminoids	\$14,910
61	95-020	Teran Watershed Enhancement	\$151,753
65	95-021	Lofer Cienega Restoration Project	\$161,204
66	95-022	Gooseberry Watershed Restoration Project	126,406
69	95-023	Sabino Creek Riparian Ecosystem Protection Project	\$16,385
80	95-024	Potrero Creek Wetland Characterization and Management Plan	\$75,300
83	96-0004	Hydrologic Investigation & Conservation Planning: Pipe Springs, Arizona	\$50,000
90	96-0010	Rehabilitating the Puertocito Wash on the Buenos Aires National Wildlife Refuge	\$83,432
92	96-0016	'Ahakhav Tribal Preserve	\$931,477
93	96-0017	Big Sandy River Riparian Project	\$92,000
94	96-0019	Response of Bebb Willow to Riparian Restoration	\$33,752
96	96-0003	Hoxworth Springs Riparian Restoration Project	\$31,545
97	96-0027	Nogales International Wastewater Treatment Plant Constructed Wetland Demonstration Project	\$352,420
99	96-0007	Ash Creek Riparian Protection Project	\$19,248
100	96-0012	Eagle Creek Watershed and Riparian Stabilization	\$80,626
101	96-0005	Tres Rios River Management and Constructed Wetlands Project	\$1,000,000

**Table 2 (cont'd.)  
Map Key**

<b>Map #</b>	<b>Project #</b>	<b>Project Title</b>	<b>Grant Amount</b>
108	96-0025	Tsaile Creek Watershed Restoration Demonstration	\$152,775
109	96-0011	Lower Colorado River – Imperial Division Restoration	\$583,276
113	96-0014	Klondyke Tailings Response Strategy Analysis (RSA)	\$90,000
115	96-0023	Watershed Restoration at the Yuma Conservation Gardens	\$31,050
118	96-0008	Watson Woods Vegetation Inventory	\$16,115
119	96-0009	Watson Woods Riparian Preserve Visitor Management	\$8,557
120	96-0006	Hydrogeologic Investigation of Groundwater Movement and Sources of Base Flow to Sonoita Creek and Implementation of Long-Term Monitoring Program	\$155,715
122	96-0018	San Carlos Springs Protection Project	\$131,540
124	96-0013	Happy Valley Riparian Area Restoration Project	\$64,697
127	96-0015	Abandonment of an Artesian Geothermal Well	\$113,360
130	96-0002	Completion Phase: Hi-Point Well Project	\$77,844
133	96-0026	Riparian Restoration on the San Xavier Indian Reservation Community	\$591,319
135	96-0020	Cienega Creek Stream Restoration	\$210,700
140	96-0001	San Pedro Riparian National Conservation Area Watershed Protection and Improvement Project	\$89,250
151	96-0021	Riparian Vegetation and Stream Channel Changes Associated with Water Management along the Bill Williams River	\$14,788
153	97-027	Lyle Canyon Allotment Restoration Project	\$55,476
155	97-028	Creation of a Reference Riparian Area in the Gila Valley – Discovery Park	\$182,000
159	97-029	Demonstration Enhancement of Pueblo Colorado Wash at Hubbell Trading Post	\$91,110
160	97-030	Walnut Creek Center for Education and Research – Biological Inventory	\$50,580
161	97-031	Atturbury Wash Project	\$154,580
162	97-032	'Ahakhav Tribal Preserve – Deer Island Revegetation	\$228,800
163	97-033	Proctor Vegetation Modification	\$11,487
164	97-034	Oak Tree Gully Stabilization	\$42,491
165	97-035	Watershed Improvement to Restore Riparian and Aquatic Habitat on the Muleshoe Ranch CMA	\$128,315
166	97-036	Stable Isotopes as Tracers of Water Quality Constituents in the Upper Gila River	\$27,338
168	97-037	Talastima (Blue Canyon) Watershed Restoration Project	\$310,192
171	97-038	Tres Rios Wetland Heavy Metal Bioavailability Design for Denitrification and Microbial Water Quality	\$117,728
175	97-040	Bingham Cienega Riparian Restoration Project	\$84,679
178	97-041	Altar Valley Watershed Resource Assessment	\$88,730
180	97-042	Queen Creek Restoration and Management Plan	\$207,595
185	97-044	San Pedro River Preserve Riparian Habitat Restoration Project	\$336,127
188	97-045	Santa Cruz Headwaters Project	\$100,445

**Table 2 (Cont'd)  
Map Key**

<b>Map #</b>	<b>Project #</b>	<b>Project Title</b>	<b>Grant Amount</b>
189	98-046	EC Bar Ranch Water Well Project	\$19,800.00
190	98-047	Upper Verde Adaptive Management Unit	\$115,300.00
192	98-048	Verde Riparian Action Plan: Riparian Species Planting Program	\$15,000.00
193	98-049	Empire/Cienega/Empirita Fencing Project	\$58,850.00
197	98-050	Watershed Restoration of a High Elevation Riparian Community	\$286,275.00
198	98-051	Evaluation of Carex Species for Use in Riparian Restoration	\$47,907.00
200	98-052	Tritium as a Tracer of Groundwater Sources and Movement in the Upper Gila River Drainage	\$41,028.00
202	98-053	Twin Lakes Riparian Restoration	\$95,366.00
203	98-054	Fluvial Geomorphology Study and Demonstration Projects to Enhance and Restore Riparian Habitat on the Gila River from the New Mexico Border	\$449,872.00
206	98-055	Horseshoe Allotment: Verde Riparian Project II	\$85,436.00
207	98-056	Classification of Riverine Habitats of the Upper Verde River	\$44,481.00
208	98-057	Upper Verde Valley Riparian Area Historical Analysis	\$41,719.00
209	98-058	Effects of Removal of Livestock Grazing on Riparian Vegetation and Channel Conditions of Selected Reaches of the Upper Verde River	\$116,500.00
212	98-059	Verde River Headwaters Riparian Restoration Demonstration Project	\$148,429.00
214	98-061	Watershed enhancement on the Antelope Allotment	\$135,807.00
215	98-062	Partnership for Riparian Conservation in Northeastern Pima County II	\$44,313.00
220	98-066	Hay Mountain Watershed Rehabilitation	\$116,525.00

**APPENDIX A:  
SUMMARY OF ONGOING GRANTS**

**AWARDED DURING FY '96**

**95-001WPF:      Stable Isotope Assessment of Groundwater and Surface Water  
Interaction - Application to the Verde River Headwaters**

Map #:                    1  
Grantee:                Arizona State University                County:                Yavapai  
AWPF Funding:      \$21,508                                        Completed:            September 1997

Project Description:    This project, located in the headwaters of the Verde River near Paulden, Arizona, was a one-year study to sample surface and groundwater in the Chino Valley and to analyze the waters for naturally occurring stable isotopes of hydrogen and oxygen. The main goal of the study was to determine if a hydraulic connection exists between the aquifers of the Chino Valley and the Verde River. This information would assist in determining the effects, if any, of groundwater pumping within the Chino Valley on the flow in the Upper Verde River.

**95-002WPF:      Partnership for Riparian Conservation in Northeastern Pima County  
(PROPIMA)**

Map #:                    5  
Grantee:                Rincon Institute                                County:                Pima  
AWPF Funding:      \$78,100                                        Completed:            August 1998

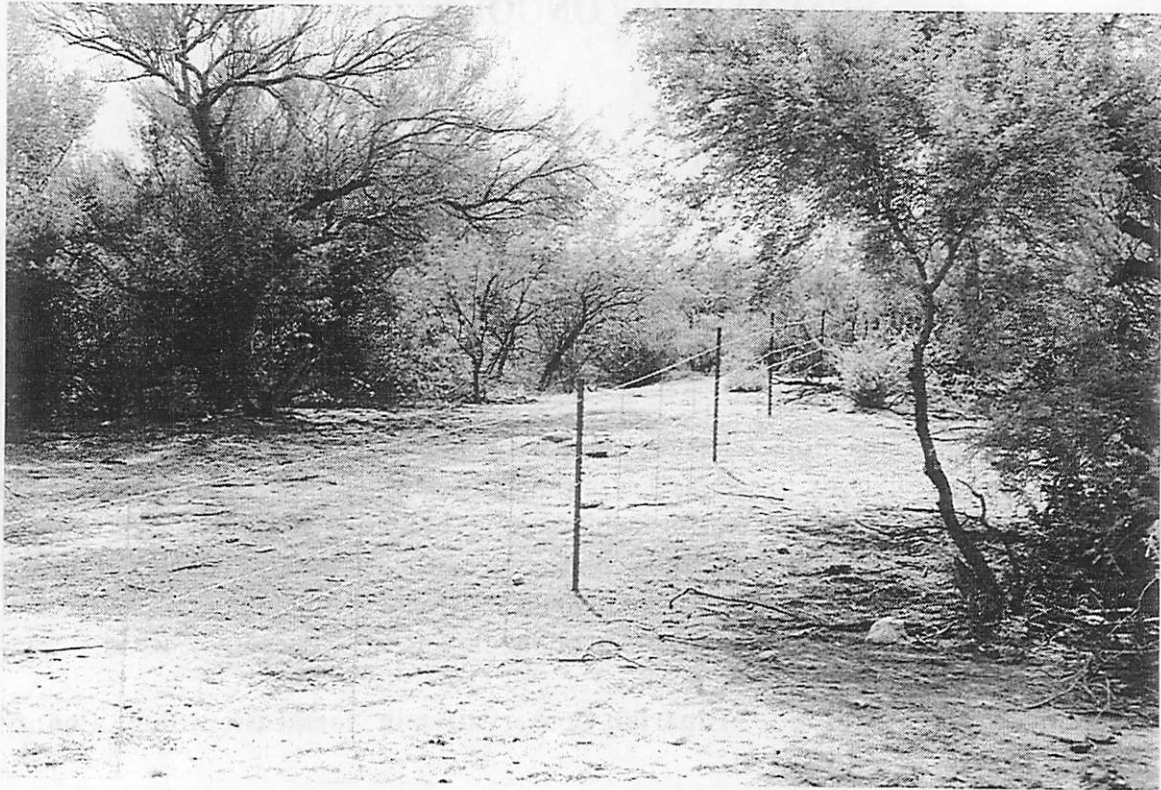
Project Description:    The Rincon Institute designed and implemented landowner-based strategies for protecting healthy riparian ecosystems from urbanization pressures in the Tanque Verde Creek and Rincon Creek watersheds. The project focused on identification and development of restoration strategies for damaged riparian ecosystems in these two watersheds. The applicant was the Rincon Institute, but the partnership involved in this study consisted of personnel from the Coronado National Forest, Saguaro National Park, University of Arizona, U.S. Geological Survey, developers and landowners in the watersheds.

**95-003WPF:      Sycamore Creek Riparian Management Area**

Map #:                    6  
Grantee:                Tonto National Forest                        County:                Maricopa  
AWPF Funding:      \$115,522                                        Completed:            May 1999

Project Description:    The purpose of the project is to restore and protect a 19 mile reach of Sycamore Creek, a major tributary of the Verde River, from uncontrolled livestock grazing and off road vehicle use. To stop further damage to the creek, 15 miles of fence will be constructed to enclose the riparian corridor. The objective is to increase the canopy cover and density of riparian vegetation within the corridor.





**Figure 2. Fencing constructed at the Sycamore Creek management area to prevent uncontrolled livestock grazing and off-road vehicle damage. 95-003WPF.**

**95-004WPF: Road Reclamation to Improve Riparian Habitat along the Hassayampa and Verde Rivers**

Map #: 10

Grantee: Prescott National Forest

County: Yavapai

AWPF Funding: \$45,693

Completed: April 1999

Project Description: This three year project will result in closure and revegetation of 19.7 miles of roads adjacent to the Hassayampa and Verde Rivers within the Prescott National Forest. The goal of the project is to reduce erosion and sedimentation into the rivers, restore riparian and upland vegetation on the closed and reclaimed road surfaces, and eliminate unauthorized roads.

**95-005WPF: Preservation of the San Pedro River Utilizing Effluent Recharge**

Map #: 32

Grantee: City of Sierra Vista

County: Cochise

AWPF Funding: \$2,562,000

Completion Date: September 2004

Project Description: This project is a partnership between the City of Sierra Vista, the Arizona Water Protection Fund and the U.S. Bureau of Reclamation. The City intends to build a constructed wetland and recharge facility as part of the expansion of their wastewater treatment

facility. The wetland will be used to improve the effluent water quality so it can be recharged back into the aquifer. By recharging effluent, the City hopes to minimize any adverse effects on the flow of the San Pedro River from groundwater pumping.

**95-006WPF: Riparian Habitat Restoration along a Perennial Reach of a Verde River Tributary**

Map #: 28  
Grantee: Northern Arizona University  
AWPF Funding: \$102,535

County: Coconino  
Completed: March 1999

Project Description: The primary purpose of this three-year project is to restore habitat critical to the successful regeneration of a Bebb willow-mixed graminoid riparian plant community in



**Figure 3. Researcher collecting soil moisture data at Hart Prairie. 95-006WPF.**

the area of Hart Prairie located northwest of Flagstaff on a tributary to Sycamore Creek. The project involves removing an existing surface water diversion, restoring the natural drainage channel, fencing critical areas, and monitoring vegetation response to hydrologic changes.

**95-007WPF: High Plains Effluent Recharge Project**

Map #: 26  
Grantee: Pima County  
Flood Control District  
County: Pima  
AWPF Funding: \$189,000  
Completion  
Date: June 2000

Project Description: This project intends to integrate riparian protection and enhancement with operation of a groundwater recharge facility utilizing Central Arizona Project water. The project is located along the effluent-dominated riparian corridor of the Santa Cruz River in the northwest portion of the Tucson Active Management Area and is the first

component of a much larger project that will stretch for several miles within the floodplain of the Santa Cruz River. Pima County Flood Control District is conducting this project in conjunction with several federal, state and local agencies.

**95-008WPF: Picacho Reservoir Riparian Enhancement Project**

Map #:

12

Grantee:

Pinal County Department of  
Civil Works

County:

Pinal

AWPF Funding: \$2,400,000

Completion Date: 2016

Project Description: This project will enable Pinal County to purchase sufficient quantities of CAP water over a 15-20 year period to protect and enhance the 2,400-acre riparian and wetland habitat that currently exists within the Picacho Reservoir. The habitat is periodically threatened by lack of water or dry-out from irrigation drawdown and drought. Under this grant, Pinal County was able to establish a minimum pool within the reservoir to provide long-term, sustainable protection and enhancement of wildlife and aquatic resources.

**95-009WPF:**

**Regeneration and  
Survivorship of Arizona  
Sycamore**

Map #:

15

Grantee:

Arizona State  
University

County:

Maricopa

AWPF Funding: \$34,617

Completed: December 1998

Project Description: The goal of this research project was to gather information on the general characteristics of the Arizona sycamore tree to help determine where and under what conditions the sycamore grows best. The project involved collection of field data along several perennial, intermittent, and ephemeral streams in southern and central Arizona, with the primary goal of increasing the understanding of factors that influence regeneration and survivorship of Arizona sycamore. Factors related to water availability and land use were evaluated in the study.



Figure 4. Collecting samples from an Arizona Sycamore.  
95-009WPF.



**95-010WPF: Assessment of the Role of Effluent Dominated Rivers in Supporting Riparian Functions**

Map #: 16

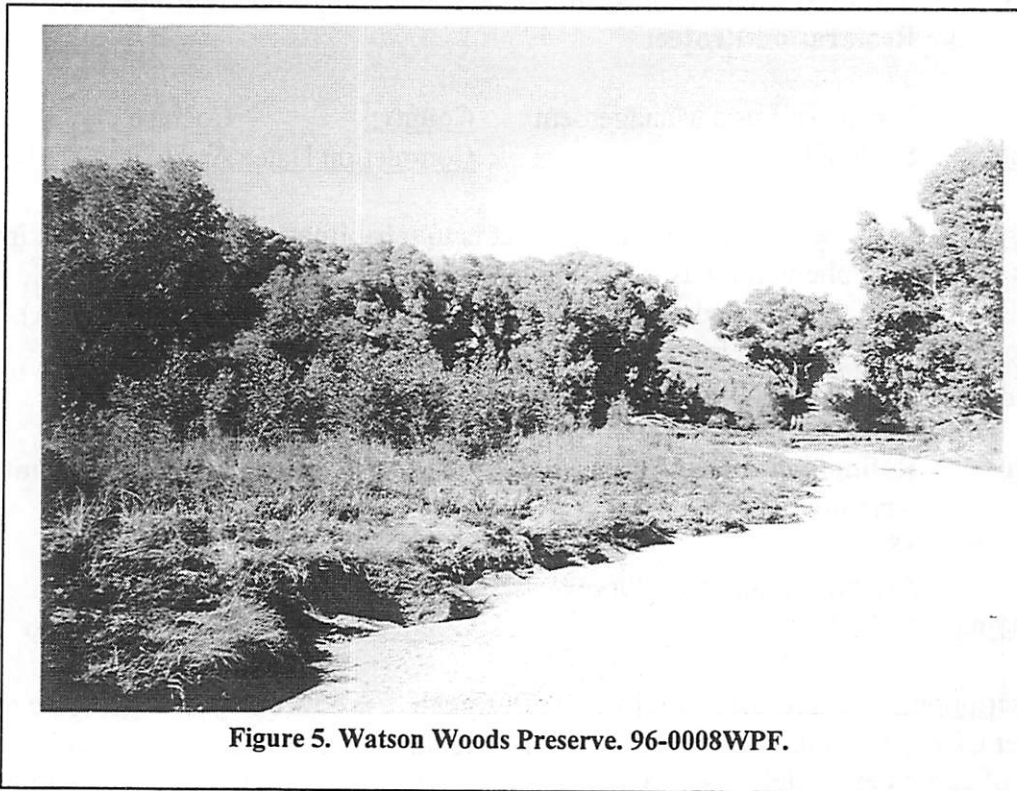
Grantee: Arizona State University

County: Maricopa

AWPF Funding: \$46,750

Completed: December 1997

Project Description: Researchers studied sites along six reaches of three Arizona streams (two reaches per stream), where both an effluent dominated section and a natural perennial section existed. The study concentrated on one of the selected streams and compared some of the functions of the riparian ecosystem along the effluent-dominated and non-effluent dominated reaches. The objective was to determine whether there were differences in ecosystem responses between effluent-dominated reaches and non-effluent dominated reaches.



**95-012WPF: The Comprehensive Plan for the Watson Woods Riparian Preserve**

Map #: 19

Grantee: Prescott Creeks Preservation Association

County: Yavapai

AWPF Funding: \$33,267

Completed: December 1996

Project Description: This project was designed to produce a comprehensive plan to manage Watson Woods, a 125 acre riparian gallery forest located along Granite Creek in Prescott, Arizona. The comprehensive plan addressed management, restoration, monitoring, and environmental education program plans.



**95-014WPF: Gila Box Riparian and Water Quality Improvement Project**  
Map #: 36  
Grantee: Bureau of Land Management County: Graham & Greenlee  
AWPF Funding: \$157,223 Completed: May 1999

Project Description: This project will improve and enhance the riparian habitat and water quality of the Gila Box Riparian National Conservation Area (RNCA) on the upper Gila River by moving livestock grazing from the river to the adjacent upland areas. Approximately six miles of fencing will be constructed, water lines, stock tanks and water pumps will be installed to provide water to the upland areas.

**95-015WPF: San Pedro Riparian National Conservation Area Watershed Rehabilitation/ Restoration Project**  
Map #: 37  
Grantee: Bureau of Land Management County: Cochise  
AWPF Funding: \$286,000 Completion Date: April 2000

Project Description: The objective of this project is to rehabilitate and restore approximately 4,450 acres of eroded, ephemeral washes and upland areas that are located 0.5 to 1 mile from the San Pedro River within the San Pedro Riparian National Conservation Area (SPRNCA). This will be accomplished by recontouring ephemeral washes and adjacent uplands and by revegetating these areas with native plant species.

**95-016WPF: Refinement of Geologic Model, Lower Cienega Basin, Pima County, Arizona**  
Map #: 38  
Grantee: Arizona Geological Survey County: Pima  
AWPF Funding: \$7,390 Completed: September 1996

Project Description: This research project was designed to produce a refined geologic model for the lower Cienega Basin, located southeast of Tucson. The geologic model is an important component of computer models that are used to predict the impact of groundwater pumping within the basin on perennial and intermittent flowing reaches of lower Cienega Creek.

**95-017WPF: Restoration of Fossil Creek Riparian Ecosystem**  
Map #: 49  
Grantee: Rocky Mountain Forest and Range Experimental Station County: Gila  
AWPF Funding: \$59,693 Completed: March 1999

Project Description: This study will determine the potential effects that re-establishment of part or all of the presently diverted flows of Fossil Creek could have on re-establishment of riparian vegetation along the stream's corridor. A major component of this project is to compare and contrast historical vegetation with present vegetation to determine the consequences of adding

additional water into the creek. The stream has been de-watered for approximately 80 years by diversions for hydroelectric use, but may receive some or all of this water within the next few years due to the relicensing process for the hydroelectric power plant.

**95-018WPF: Autecology & Restoration of *Sporobolus wrightii* Riparian Grasslands in Southern Arizona**

Map #: 54

Grantee: Arizona State University

County: Cochise, Santa Cruz, Pima

AWPF Funding: \$53,743

Completed: June 1999

Project Description: This study will acquire ecological information necessary to understand the natural processes allowing for regeneration and maintenance of *Sporobolus wrightii* (giant sacaton) riparian grasslands along rivers in southern Arizona. This information will be used to determine the natural recovery and restoration potential of this type of community on abandoned agricultural fields located along these alluvial river systems.

**95-019WPF: Quantifying Anti-Erosion Traits of Streambank Graminoids**

Map #: 55

Grantee: Arizona State University

County: Pima

AWPF Funding: \$14,910

Completed: December 1997

Project Description: This study measured and compared physical traits of streamside grasses and grass-like plants (graminoids) to determine their potential capacity to stabilize streambanks. The study sites were located on Cienega Creek in Pima County. The study looked at grasses and graminoids in terms of their erosion-prevention effectiveness for stream restoration and bank stabilization projects.

**95-020WPF: Teran Watershed Enhancement**

Map #: 61

Grantee: Redington Natural Resource Conservation District

County: Cochise

AWPF Funding: \$151,753

Completed: April 1999

Project Description: The purpose of this project is to improve watershed conditions within the Teran Watershed, located along the San

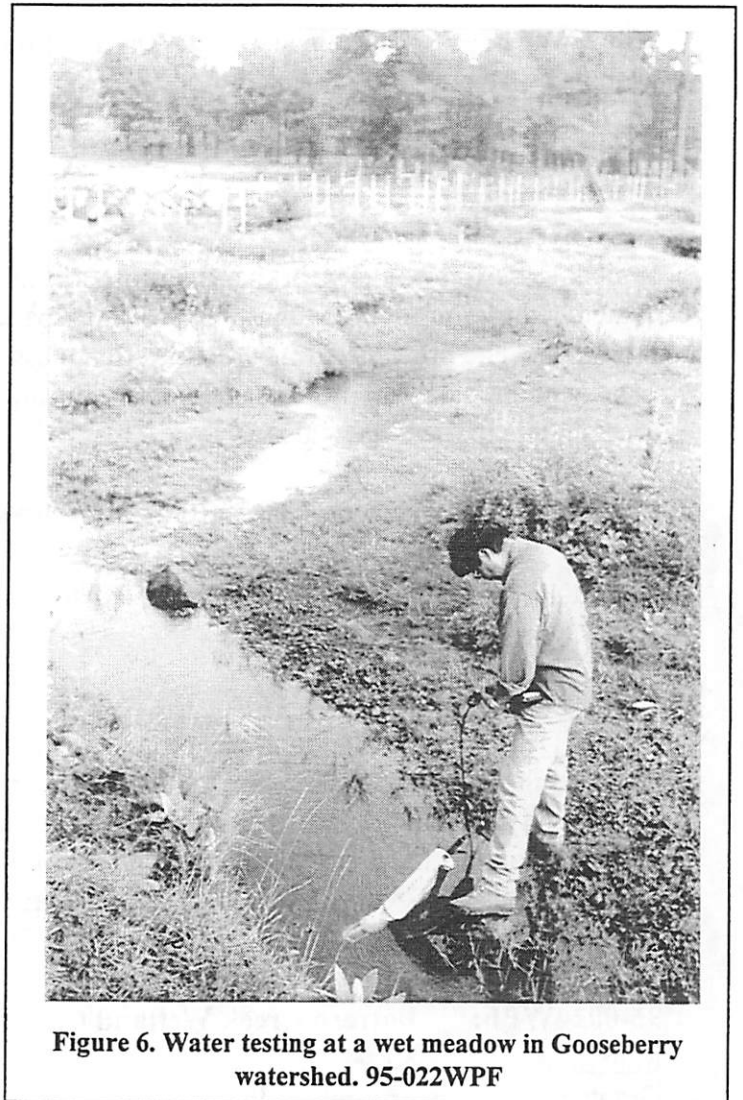


Figure 6. Water testing at a wet meadow in Gooseberry watershed. 95-022WPF

Pedro River. Thousands of small, loose-rock dam structures have been constructed in an attempt to reduce surface water runoff rates, increase duration of channel flow, improve groundwater recharge and enhance riparian habitat for wildlife.

**95-021WPF: Lofer Cienega Restoration Project**

Map #: 65  
Grantee: White Mountain Apache Tribe      County: Apache  
AWPF Funding: \$161,204      Completed: March 1999

Project Description: This project incorporates stream assessments, long-term monitoring, fence construction, grazing management, biological assessments, and feral horse trapping and removal in an attempt to restore Lofer Cienega. Lofer Cienega is one of the largest cienegas on the Fort Apache Indian Reservation and when restored, should provide critical wildlife and fish habitat. In addition it is a significant cultural resource to the tribe.

**95-022WPF: Gooseberry Watershed Restoration Project**

Map #: 66  
Grantee: White Mountain Apache Tribe      County: Apache  
AWPF Funding: \$126,406      Completed : March 1999

Project Description: The primary purpose of this project is to restore the health of Gooseberry Watershed by improving management of the riparian meadows and reconstructing stream crossings. The project will incorporate stream assessments, improved riparian grazing management, clean-up projects and public education, channel restoration and biologic assessments to meet its goals.

**95-0023WPF: Sabino Creek Riparian Ecosystem Protection Project**

Map #: 69  
Grantee: Hidden Valley Homeowners Association      County: Pima  
AWPF Funding: \$16,385      Completed: April 1998

Project Description: Through this project, the Hidden Valley Homeowners Association acquired the necessary equipment to record streamflow measurements and to write a report which analyzes and presents data in a format that can be submitted to the Arizona Department of Water Resources in support of an application for non-consumptive, instream flow water right for a reach of Sabino Creek. The project area is a privately owned natural riparian park owned by the Hidden Valley Homeowner's Association in Tucson.

**95-0024WPF: Potrero Creek Wetland Characterization and Management Plan**

Map #: 80  
Grantee: EnviroNet, Inc.      County: Santa Cruz  
AWPF Funding: \$75,300      Completed: May 1997

**Project Description:** This wetland/riparian area is located adjacent to Nogales. The purpose of this one-year project was to determine the source of water that sustains the wetland/riparian area, and to determine factors critical to its continuation as a wetland area. The grantee also evaluated the area's potential for habitat improvement or habitat replication. The project included both a biologic and hydrogeologic evaluation of the site as well as development of a wetland management plan.

**AWARDED DURING FY '97**

**96-0001WPF: San Pedro Riparian National Conservation Area Watershed Protection and Improvement Project**

**Map #:** 140

**Grantee:** Bureau of Land Management

**County:** Cochise

**AWPF Funding:** \$89,250

**Completed:** September 1998

**Project Description:** The project's purpose is to improve, enhance and protect the riparian habitats and water quality in the San Pedro National Riparian Conservation Area. Part of the funds were spent on installation of 12 miles of fencing to eliminate livestock trespass on 36 miles of the San Pedro River. This project will enhance the riparian ecosystem and associated wildlife habitats without undue impacts to upland grazing allotments.

**96-0002WPF: Completion Phase: Hi-Point Well Project**

**Map #:** 130

**Grantee:** Navajo County Natural Resource Conservation District

**County:** Coconino

**AWPF Funding:** \$77,844

**Completion Date:** October 1999

**Project Description:** The grantee will develop 24 water troughs and 3.5 miles of cross fencing to more evenly distribute grazing by livestock and ungulates. The objective is to improve vegetative cover, thereby reducing erosion and sediment deposition in both Chevelon Creek and Clear Creek, perennial tributaries to the Little Colorado River.

**96-0003WPF: Hoxworth Springs Riparian Restoration Project**

**Map #:** 96

**Grantee:** Northern Arizona University

**County:** Coconino

**AWPF Funding:** \$31,545

**Completed:** June 1999

**Project Description:** Scientists at NAU are working with the Coronado National Forest to restore the historic stream channel to a portion of a perennial stream that flows from Hoxworth Springs. The stream has experienced downcutting and a significant loss of riparian vegetation due to channelization and intense grazing from livestock and elk. Channel stabilization will be accomplished using earth moving equipment and revegetation. Elk exclosures will be constructed to reduce grazing pressure during restoration efforts.



**96-0004WPF: Hydrologic Investigation and Conservation Planning: Pipe Springs, AZ**  
Map #: 83  
Grantee: National Park Service, Pipe Springs National Monument  
County: Mohave  
AWPF Funding: \$50,000  
Completed: November 1998

Project Description: This project included a detailed chemical analysis of water from Pipe Springs and from springs and wells in the surrounding area. The objective was to determine the cause(s) of decreased spring flow. A conceptual model will be developed of the groundwater flow system feeding the springs. The project will provide a better understanding of the groundwater hydrology of the aquifer associated with the springs and wells in the immediate vicinity, providing information for wise water use planning for all area users.



Figure 7. Spring at Pipe Springs National Monument.  
96-0004WPF.

**96-0005WPF: Tres-Rios River Management and Constructed Wetlands Project**

Map #: 101  
Grantee: City of Phoenix  
County: Maricopa  
AWPF Funding: \$1,000,000  
Completion Date: May 2000

Project Description: This grant will fund part of the costs associated with preparing an environmental impact statement for the Tres-Rios wetlands. The Tres-Rios project will provide a continuous and constant source of water in the Salt River that will maintain riparian vegetative communities and associated wildlife habitat.

**96-0006WPF: Hydrogeologic Investigation of Groundwater Movement and Sources of Base Flow to Sonoita Creek and Implementation of Long-Term Monitoring Program**

Map #: 120  
Grantee: The Nature Conservancy  
County: Santa Cruz

AWPF Funding: \$155,715

Completed: August 1999

Project Description: This project will obtain hydrogeologic data from new groundwater monitoring wells and will assist in determining sources of groundwater discharge that sustain base flow in the perennial reach of Sonoita Creek upstream from Lake Patagonia in Santa Cruz County.

**96-0007WPF: Ash Creek Riparian Protection Project**

Map #: 99

Grantee: Mingus Springs Camp;  
Henry Dahlberg Foundation

County: Yavapai

AWPF Funding: \$19,248

Completion Date: October 1999

Project Description: The Ash Creek project is a joint effort between the Mingus Springs Camp and the U.S. Forest Service to restore the riparian habitat fed by several springs. The project will improve turkey habitat and extend the riparian area by increasing water retention through the construction of gabions and log dams.

**96-0008WPF: Watson Woods Vegetation Inventory**

Map #: 118

Grantee: Prescott Creeks Preservation  
Association

County: Yavapai

AWPF Funding: \$16,115

Completed: April 1998

Project Description: The Watson Woods Vegetation Inventory will characterize the vegetative communities within the Watson Woods Riparian Preserve in order to describe baseline conditions at the site. This information will guide management and restoration efforts at the

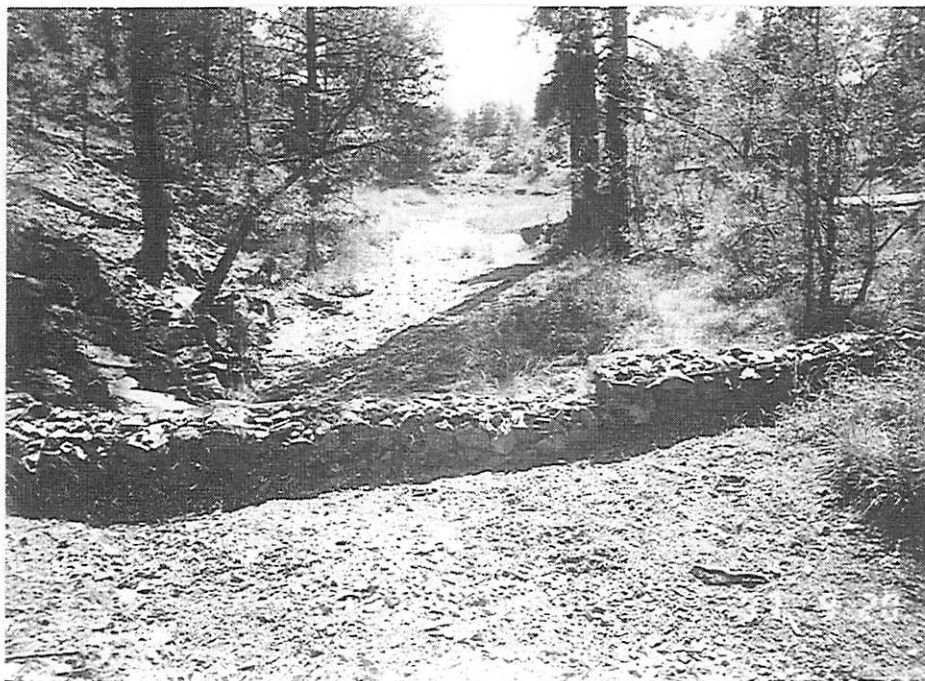


Figure 8. Erosion control structure at Mingus Springs Camp. 96-0007WPF.

preserve.

**96-0009WPF: Watson Woods Riparian Preserve Visitor Management**

Map #: 119

Grantee: Prescott Creeks Preservation Association      County: Yavapai

AWPF Funding: \$8,557      Completed: August 1997

Project Description: The Watson Woods Riparian Preserve has an on-going need to manage visitor activities including control of access, maintenance of infrastructure, public outreach and educational information. This grant will allow preserve managers to develop a plan that will facilitate a better quality visitor experience and will protect the park itself from degradation due to inappropriate use.

**96-0010WPF: Rehabilitating the Puertocito Wash on the Buenos Aires National Wildlife Refuge**

Map #: 90

Grantee: Arizona Conservation Voters Habitat Fund      County: Pima

AWPF Funding: \$83,432      Completion Date: November 1999

Project Description: This project will rehabilitate Puertocito Wash, an eroded ephemeral stream, through the construction of two gabions along the stream course and the re-establishment of native grasses. A resource monitoring program will be designed and implemented and a watershed demonstration area will be established for local ranchers and other members of the public.

**96-0011WPF: Lower Colorado River - Imperial Division Restoration**

Map #: 109

Grantee: Bureau of Reclamation      County: Yuma

AWPF Funding: \$583,276      Completion Date: July 2001

Project Description: This project will restore streamflow to small backwater channels and about 50 acres of dried-out wetlands along the lower Colorado River. Areas will be revegetated with native riparian plant species. The grantee hopes to create higher quality riparian and aquatic habitat along this reach of the river.

**96-0012WPF: Eagle Creek Watershed and Riparian Stabilization**

Map #: 100

Grantee: James F. Holdar      County: Greenlee

AWPF Funding: \$80,626      Completion Date: December 1999

Project Description: This project will improve the watershed, upland range and riparian community of Eagle Creek through the installation of fencing, grazing management, and the expansion of an existing pipeline to distribute water sources throughout the upland area.

**96-0013WPF: Happy Valley Riparian Area Restoration Project**  
Map #: 124  
Grantee: Coronado National Forest County: Pima  
AWPF Funding: \$64,697 Completed: July 1999

Project Description: The Paige Creek riparian area is a unique, large riparian gallery located on the east side of the Rincon Mountains. The grantee will fence the riparian area, create upland water sources for ungulates, construct an instream structure to reduce water velocity and construct a pipe barrier fence to restrict vehicle access to sensitive areas.

**96-0014WPF: Klondyke Tailings Response Strategy Analysis**  
Map #: 113  
Grantee: Arizona Department of Environmental Quality County: Graham  
AWPF Funding: \$90,000 Completed: August 1998

Project Description: In this project, a team of scientists led by Arizona Department of Environmental Quality collected data to determine the extent of impact on Aravaipa Creek from runoff or leaching of contaminated mine tailings at the Klondyke tailings pile. The team developed a response strategy to determine the best methods of treating the tailings pile to reduce or prevent groundwater and stream contamination by leaching, runoff or erosion of the tailings into the stream.

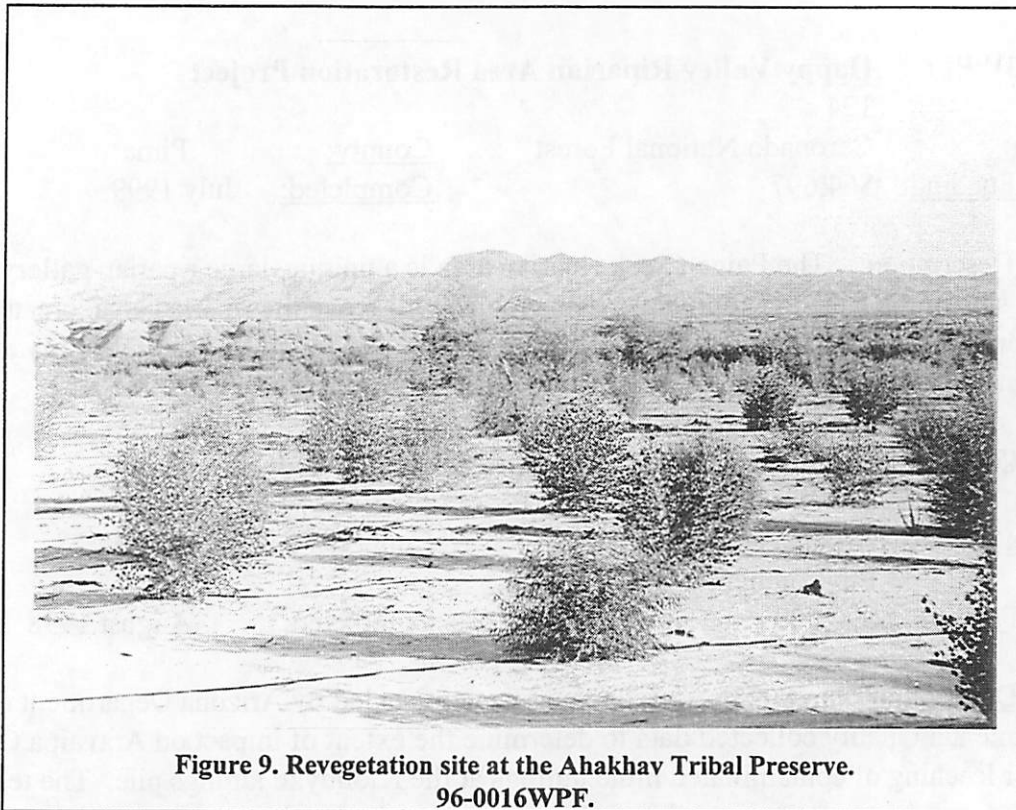
**96-0015WPF: Abandonment of an Artesian Geothermal Well**  
Map #: 127  
Grantee: Smithville Canal Company County: Graham  
AWPF Funding: \$113,360 Completion Date: December 1999

Project Description: The grantee has capped a deep, artesian geothermal well, near the Gila River, north of Thatcher Arizona. Discharge from the well was highly saline and was degrading soils and plants in the vicinity and, possibly, degrading downstream water quality in the Gila River. The grantee is now monitoring the site to evaluate changes due to well abandonment.

**96-0016WPF: The 'Ahakhav Tribal Preserve**  
Map #: 92  
Grantee: Colorado River Indian Tribes County: La Paz  
AWPF Funding: \$931,477 Completion Date: April 2000

Project Description: The Colorado River Indian Tribes will re-establish riparian and wetland habitat in a 110 acre area of the 'Ahakhav Tribal Preserve. The grantee will re-establish fish and wildlife riparian and wetland habitat by dredging some historic backwater river channels, revegetating native riparian vegetation and establishing a monitoring program to ensure successful restoration of the riparian habitat along the Colorado River.





**Figure 9. Revegetation site at the Ahakhav Tribal Preserve.  
96-0016WPF.**

**96-0017WPF: Big Sandy River Riparian Project**

Map #: 93  
Grantee: Bureau of Land Management      County: Mohave  
AWPF Funding: \$92,000      Completion Date: January 2000

Project Description: This project will help to restore an approximately 8 mile perennial reach along the Big Sandy River south of the Kingman Resource Area near Alamo Lake. Under this grant, pasture fencing will be constructed to help control livestock. Additionally, the development of upland livestock water sources will facilitate the management of livestock grazing outside of the riparian area.

**96-0018WPF: San Carlos Spring Protection Project**

Map #: 122  
Grantee: San Carlos Apache Tribe      County: Graham  
AWPF Funding: \$131,540      Completion Date: Cancelled at request of grantee.

Project Description: Prior to cancellation, the grantee fenced 8 springs on the San Carlos Apache Reservation to protect them from grazing and trampling by livestock. Pipelines and water troughs were installed to provide water to the livestock away from the spring sites.



**96-0019WPF: Response of Bebb Willow to Riparian Restoration**

Map #: 94  
Grantee: Northern Arizona University  
County: Coconino  
AWPF Funding: \$33,752  
Completed: May 1999

Project Description: The grantee will restore water flow through a decadent Bebb willow ecosystem, and then quantify and compare the response of the plant community to the water flow. The project is intended to improve understanding of the structure, function and dynamics of a watershed and its associated terrestrial and riparian ecosystems.

**96-0020WPF: Cienega Creek Stream Restoration**

Map #: 135  
Grantee: Bureau of Land Management  
County: Pima  
AWPF Funding: \$210,700  
Completion Date: October 1999

Project Description: The grantee will remove an agricultural diversion canal that is no longer used, and re-establish flow through the Cienega Creek channel. Volunteers from Sonoita and Tucson will collect and maintain plant material salvaged from the project site and will revegetate areas disturbed during project activities.

**96-0021WPF: Riparian Vegetation and Stream Channel Changes Associated with Water Management along the Bill Williams River**

Map #: 151  
Grantee: Arizona State University  
AWPF Funding: \$14,788  
County: Mohave  
Completed: November 1998

Project Description: The project produced quantitative data on the relationship between streamflow and historic changes in the riparian community and channel morphology along Bill Williams River below Alamo Dam. This information will be used in an ongoing effort to define reservoir operation regimes that will ensure protection of the riparian habitat downstream of Alamo Dam.



**Figure 10. Flume installed to measure stream flow at Hart Prairie. 95-005WPF.**

**96-0022WPF: Saffell Canyon and Murray Basin Watershed Restoration Project**

Map #: 103

Grantee: Apache Sitgreaves National Forest      County: Apache

AWPF Funding: \$24,316      Completion Date: October 1998

Project Description: The objectives of this project are to restore watershed health and improve water quality in Murray Basin and Saffell Canyon. The grantee is attempting to determine the best methods to reduce and reverse soil erosion in the watershed. The Murray Basin and Saffell Canyon watershed have been severely damaged by past management practices.

**96-0023WPF: Watershed Restoration at the Yuma Conservation Gardens**

Map #: 115

Grantee: Yuma Conservation Garden      County: Yuma

AWPF Funding: \$31,050      Completed: March 1999

Project Description: The grantee will renovate a five acre model watershed that is used as an outdoor classroom at the Yuma Conservation Garden (YCG). The YCG is a 28 acre natural area established in the 1950's for education and recreational purposes. The project area was established in 1962, and is used to teach the public about watershed issues in the Yuma area.



**Figure 11. Site of potential road failure due to bank erosion, Canyon del Muerto. 96-0025WPF.**

**96-0025WPF: Tsaile Creek  
Watershed Restoration  
Demonstration**

Map #: 108

Grantee: The Navajo Nation

County: Apache

AWPF Funding: \$152,775

Completion Date: July 2000

Project Description: The grantee will develop six watershed restoration projects with concurrent workshops to demonstrate riparian restoration concepts to local residents, tribal employees and resource conservation professionals. The projects will focus on biological restoration approaches. The grantee will use these projects to build community support for broader watershed restoration efforts.

**96-0026WPF: Riparian  
Restoration on the San  
Xavier Indian Reservation  
Community**

Map #: 133

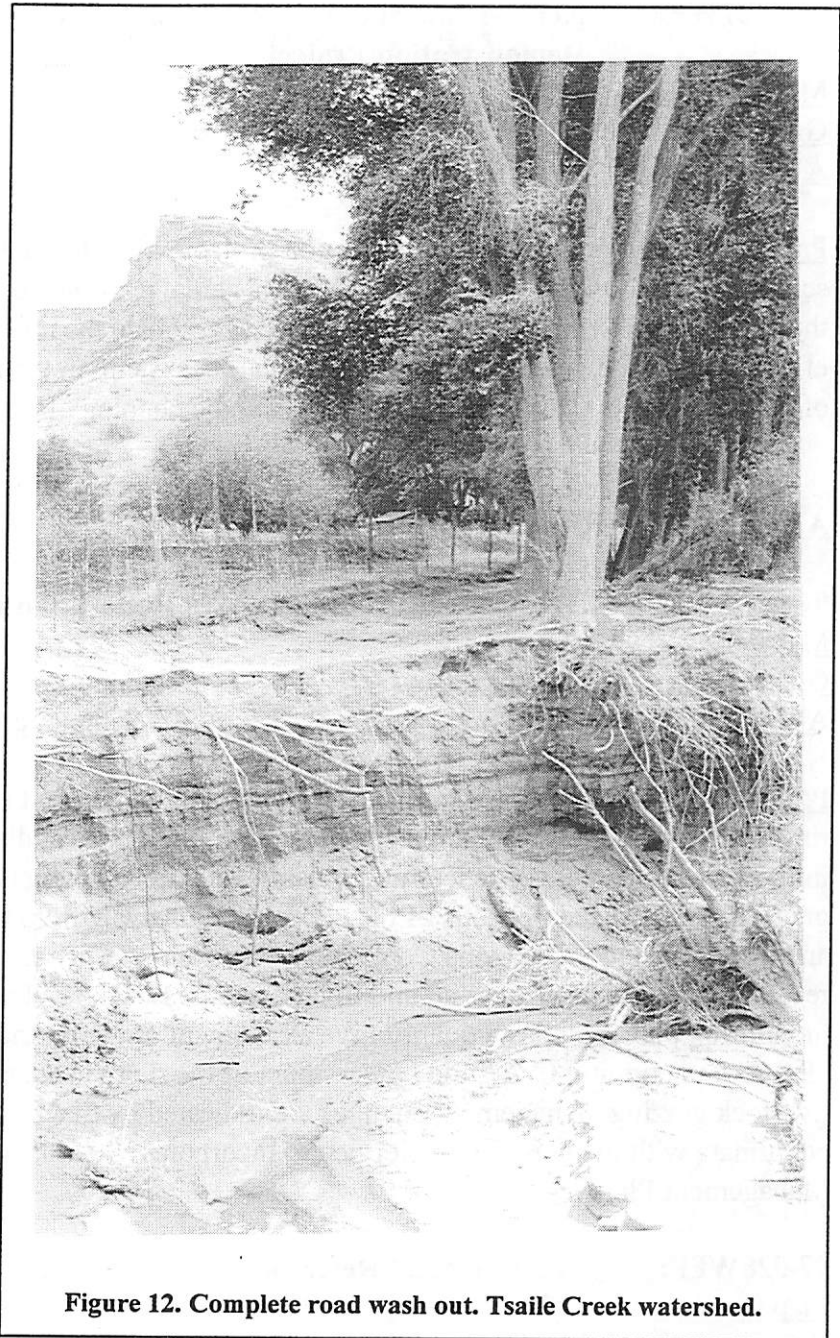
Grantee: San Xavier Indian  
Reservation

County: Pima

AWPF Funding: \$591,319

Completion Date: May 1999

Project Description: The San Xavier District of the Tohono O'odham Tribe will evaluate various options for riparian restoration on their lands. The community will have an opportunity to be involved in the planning and decision process. Sites for riparian restoration will be chosen based on physical/biological conditions and community preference. A restoration plan will be developed and implemented.



**Figure 12. Complete road wash out. Tsaile Creek watershed.**

**96-0027WPF: Nogales International Wastewater Treatment Plant Constructed Wetland Demonstration Project**

Map #: 97  
Grantee: City of Nogales, Arizona County: Santa Cruz  
AWPF Funding: \$352,420 Completion Date: Contract cancelled at request of grantee.

Project Description: This demonstration project will determine the appropriateness of a full scale wetland for wastewater treatment in this area, possibly coupled with a recharge project for the upper Santa Cruz River. Overall objectives include the reduction of ammonia in the current effluent discharge, habitat development, riparian system protection and enhancement, protection of Nogales' Santa Cruz River water supply and technology transfer to Mexico.

**AWARDED DURING FY '98**

**97-027WPF Lyle Canyon Allotment Area Restoration Project**

Map #: 153  
Grantee: Byrd Lyndsey County: Cochise, Santa Cruz  
AWPF Funding: \$55,476.33 Completion Date: October 2001

Project Description: The purpose of the Lyle Canyon project is to restore and protect the riparian areas on the Lyle Canyon Allotment through the installation of a variety of range improvements, including fences and upland water developments that will better distribute cattle grazing in the upland portions of the allotment, and away from the riparian areas. The Grantee and the University of Arizona Cooperative Extension Office have developed a monitoring plan to record the condition of riparian and upland habitats on the Lyle Canyon Allotment. The monitoring plan includes a quantitative assessment of the riparian and upland vegetation, a "Proper Functioning Condition" assessment of the riparian areas, and photo point monitoring. If livestock grazing management changes are indicated by the monitoring data the grantee will coordinate with the U.S. Forest Service to incorporate those changes into the Allotment Management Plan.

**97-028WPF: Creation of a "Reference" Riparian Area in the Gila Valley**

Map #: 155  
Grantee: Mt. Graham International County: Graham  
Science & Culture Foundation  
AWPF Funding: \$182,000 Completion Date: May 2000

Project Description: The purpose of this project is to create a riparian system in a highly visible area along a tributary to the environmentally significant Gila River. Information from the creation of this area in the Gila Valley will provide on-site riparian benefits to wildlife and the watershed. The project has a significant outreach and educational component that will explain the benefits of establishing riparian areas. The grantee will also provide information on techniques used to land management agencies and to the public.



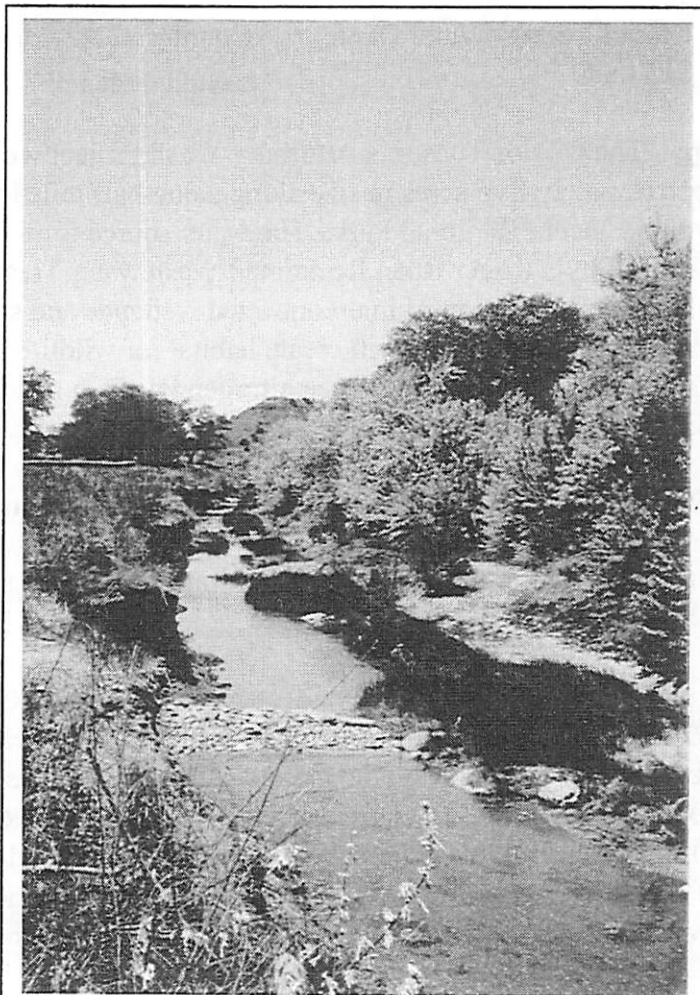
**97-029WPF: Demonstration Enhancement of Pueblo Colorado Wash at Hubbell Trading Post**

Map #: 159

Grantee: National Park Service, County: Apache  
Hubbell Trading Post National Historic Site

AWPF Funding: \$91,110 Completion Date: May 2001

Project Description: The Hubbell Trading Post National Historic Site proposes to re-establish, enhance and conserve one-half mile of the Pueblo Colorado Wash within the boundaries of the Historic Site. The stream channel will be restored using low-tech instream structures to restore meanders and pools. The objective for installing these structures is to slow stream flows so that sediment will be deposited in point bars that will eventually support riparian vegetation. Invasive plant species will be removed from the riparian area. The stream channel and riparian areas will be revegetated with appropriate native species such as native reed, willows and cottonwoods. Restoration efforts and water quantity will be evaluated to determine changes that result from project activities. Hydro-meteorological monitoring will also be conducted to establish hydrological baseline data for the wash.



**Figure 13. Low-tech instream structures to restore meanders and pools at the Hubbell Trading Post. 97-029WPF.**



**97-030WPF: Walnut Creek Center for Education and Research - Biological Inventory**  
Map #: 160  
Grantee: Yavapai College County: Yavapai  
AWPF Funding: \$50,580 Completion Date: May 2001

Project Description: The Walnut Center for Education and Research is located approximately 35 miles northwest of Prescott in the Williamson Valley. The site is being leased from the Prescott National Forest under a special use permit. The Walnut Creek Center for Education and Research is a partnership comprised of staff from NAU, Prescott College, Sharlot Hall Museum and Yavapai College. The purpose of the project is to conduct a two-year inventory of the 280 acre site. Specifically, inventories of vegetation, birds, mammals and reptiles will be conducted and physical components of stream geomorphology, topography and soils will be evaluated. Upon completion, these data will be used to establish a baseline condition for the site's physical and biological resources as a precursor to the development of a long-term management and operational plan for the Center site.

**97-031WPF: Atturbury Wash Project**  
Map #: 161  
Grantee: City of Tucson Water Dept. County: Pima  
AWPF Funding: \$154,580 Completion Date: April 2000

Project Description: The City of Tucson's Atturbury Wash Project will establish a sustainable riparian habitat, approximately five acres in size along a one-half mile long tributary of the Atturbury Wash within Lincoln Regional Park. The water source for the project is secondary effluent produced at the City's Roger Road Reclaimed Wastewater Treatment Plant. The project has three major objectives: 1) creation of interconnected wetlands and shallow ponds that will support planted emergent vegetation and will create habitat for wildlife; 2) provide information on the capacity of small scale wetlands to reduce nitrogen levels in reclaimed wastewater; and, 3) provide water quality data down-gradient of the wetlands.

**97-032WPF: 'Ahakhav Tribal Preserve - Deer Island Revegetation**  
Map #: 162  
Grantee: Colorado River Indian Tribes County: La Paz  
AWPF Funding: \$228,800 Completion Date: February 2000

Project Description: The 'Ahakhav Tribal Preserve on the Colorado River Indian Reservation is approximately 1042 acres in size. The construction of dams and channelization of the Colorado River as well as the introduction of the exotic and invasive saltcedar has left the Preserve nearly devoid of cottonwoods and willows. Because saltcedar does not provide adequate cover, food and thermal protection, this habitat type supports a significantly lower diversity of insects, birds and other wildlife. The Grantee will remove low-quality exotic plants near the Deer Island backwater, and revegetate the site with native plants including cottonwood, willow, mesquite, wolfberry and four-wing saltbush.

**97-033WPF: Proctor Vegetation Modification**

Map #: 163

Grantee: Coronado National Forest

County: Pima

AWPF Funding: \$11,487

Completion Date: March 2001

Project Description: This project site is about 200 acres of upland area along Madera Canyon within Pima County. The project goal is to reduce the upland mesquite component of the existing overstory with minimal harm to other tree species and to restore the herbaceous understory to a condition dominated by native perennial grass species. There is currently little perennial grass understory at this site due to shading from the excessive mesquite overstory. Perennial grasses are important to soil stability by reducing soil erosion and the resulting turbidity in streams, allowing beneficial water retention, litter development and organic matter levels within the soils, and improving rainfall percolation into the ground. The project will remove upland mesquite trees with main stem diameters less than 5 inches, temporarily restrict vehicle use in the area for several years, enforce livestock grazing standards and guidelines and refurbish a stockpond to draw cattle away from the treatment and regrowth site.

**97-034WPF: Oak Tree Gully Stabilization**

Map #: 164

Grantee: Coronado National Forest

County: Pima

AWPF Funding: \$42,491

Completion Date: April 2001

Project Description: The advancement of headcuts in the Oak Tree Canyon and Empire Gulch areas appear to be impacting Cienega Creek through erosional activities. Cienega Creek has recently been designated as a Unique Water, under the Clean Water Act and it is believed that headcutting in the tributaries are leading to increased turbidity in the Creek. The headcuts appear to be deteriorating primarily as a result of the presence of the Forest Service road and unauthorized vehicular use throughout the area. The project involves the treatment of 30 headcuts in the Oak Tree Canyon and Empire Gulch areas through reshaping of the gullies and mechanisms designed to decrease flow velocity and energy to reduce head- and side-cutting. Monitoring of the headcuts and erosional activity will be performed throughout the project duration and long-term using photo points, and examining structural integrity and channel morphology.

**97-035WPF: Watershed Improvement to Restore Riparian and Aquatic Habitat on the Muleshoe Ranch CMA**

Map #: 165

Grantee: The Nature Conservancy

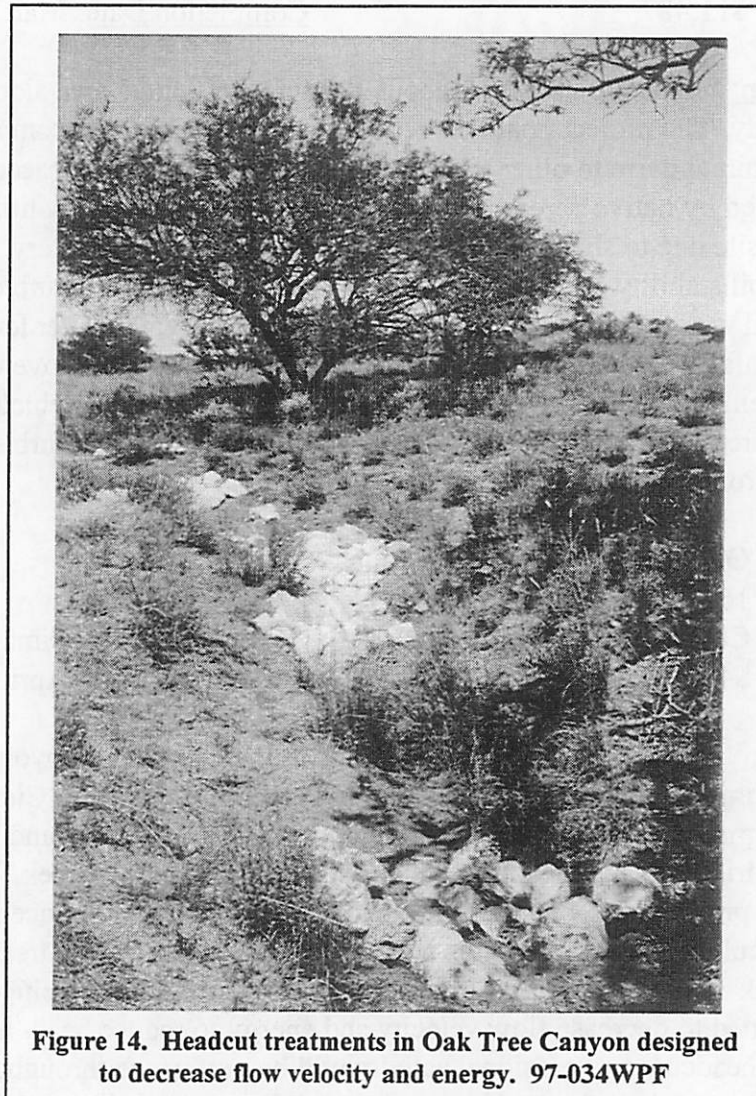
County: Cochise

AWPF Funding: \$128,315

Completion Date: May 2001

Project Description: The purpose of this project is to restore riparian and aquatic habitat in four perennial streams on the Muleshoe Ranch Cooperative Management Area (CMA) by restoring watershed vegetation and function. This will be accomplished by restoring fire as a natural process in the watershed using prescribed burns. The grantee proposes to continue grazing rest until vegetation recovery occurs. A comprehensive monitoring program will be maintained for at

least ten years, including monitoring of short term effects of prescribed burns. Fencing will be constructed along 1.5 miles within the project area.



**97-036WPF: Stable Isotopes As Tracers of Water Quality Constituents in the Upper Gila River**

Map #: 166

Grantee: Arizona Geological Survey

County: Cochise, Graham, Greenlee

AWPF Funding: \$27,338

Completed: July 1999

Project Description: Water quality issues are becoming increasingly important in the upper Gila River drainage area. Decades of water quality measurements have documented the concentrations of total dissolved solids (TDS) in the Gila River and groundwater, but the precise sources (natural and human) of the TDS are not known. This project will identify the sources and conveyance points of dissolved solids entering the upper Gila River through the use of

naturally-occurring stable isotopes. The study area encompasses approximately 200 square miles in southeastern Arizona. Based on the results of the study, the Grantee will develop recommendations for mitigation and further studies in the region.

**97-037WPF: Talastima (Blue Canyon) Watershed Restoration Project**  
Map #: 168  
Grantee: The Hope Tribe County: Coconino, Navajo  
AWPF Funding: \$310,192 Completion Date: May 2001

Project Description: The purpose of this project is to restore the Talastima watershed, almost 8,000 acres containing 19 miles of streams and wetlands on Hopi lands. Restoration measures will include a tamarisk and Russian olive removal demonstration project, revegetation of native riparian species, erosion control using straw bales, completing livestock exclosures with fencing, installation of a monitoring well and seven drive-point wells, and a study of road impacts on riparian health. Monitoring will be conducted using on-ground data collection combined with remote sensing techniques. Monitoring will be conducted to assess the success of tamarisk and Russian olive removal, the success of revegetating with native wetland and riparian vegetation, the effects of revegetation activities on groundwater levels and quality and surface water flows and quality, and the effects of restoration activities on raptors and neotropical migratory birds in the project area.

**97-038WPF: Tres Rios Wetland Heavy Metal Bioavailability Design for Denitrification and Microbial Water Quality**  
Map #: 171  
Grantee: City of Phoenix County: Maricopa  
AWPF Funding: \$117,728 Completion Date: September 2000

Project Description: The purpose of this project is to investigate three issues identified during operation of the Tres Rios Wetland Demonstration Project: 1) Are heavy metals in the wetlands bioavailable and are there operational strategies that would mitigate or exacerbate this phenomena 2) What is the contribution of autotrophic bacteria to the overall denitrification efficiency of the wetland and can this information be used to better estimate wetland surface area requirements, and 3) Are bacteria/pathogen concentrations due to wildlife inputs or re-growth, and what is the survivability of pathogens in a constructed wetland. Sampling and analysis of water, sediment, vegetation and fish tissue will be conducted to achieve the project objectives, and the findings of this study will be presented in an interpretative final report.

**97-040WPF: Bingham Cienega Riparian Restoration Project**  
Map #: 175  
Grantee: Pima County Flood Control County: Pima  
District  
AWPF Funding: \$84,679 Completion Date: April 2001

Project Description: The objective of the project is to restore native riparian vegetation to 50 acres of abandoned agricultural fields at Bingham Cienega along the San Pedro River. Planting

areas have been delineated based on site hydrology factors such as groundwater gradients. Plant species were selected based on published relationships between riparian plant distribution and depth-to-groundwater. Three planting areas have been delineated and will be planted to restore different riparian community types. In one area, livestock will be used to graze on exotic weeds and enhance propagation of mesquite trees.

**97-041WPF: Altar Valley Watershed Resource Assessment**  
Map #: 178  
Grantee: Altar Valley Conservation Alliance      County: Pima, Santa Cruz  
AWPF Funding: \$88,730      Completion Date: October 2000

Project Description: The Pima Natural Resource Conservation District, in association with the Altar Valley Conservation Alliance, will conduct an assessment of the Altar Valley natural resources and identify problems and areas for improvement. The Grantee will research historic conditions, describe existing conditions, conduct detailed vegetation mapping, and produce community outreach materials. The end product will be an action plan for the restoration of the watershed which identifies and prioritizes problem areas needing attention, describes feasible remedies, and identifies the potential financial means to implement the appropriate land treatments, ranch conservation improvements and resource management changes.

**97-042WPF Queen Creek Restoration & Management Plan**  
Map #: 180  
Grantee: Town of Superior      County: Pinal  
AWPF Funding: \$207,595      Completion Date: September 1999

Project Description: A Queen Creek Restoration and Management Plan will be developed for the Queen Creek corridor that extends from the headwaters on Tonto National Forest, through the Town of Superior to the Boyce Thompson Southwestern Arboretum. The plan will address restoration of stream flow and riparian vegetation, and technical studies will be conducted to determine riparian vegetation water needs and channel flood conveyance capacity. A Committee of Stakeholders, including affected landowners and other interested entities, will be established and two public workshops will be conducted.

**97-044WPF: San Pedro River Preserve Riparian Habitat Restoration Project**  
Map #: 185  
Grantee: The Nature Conservancy      County: Pinal  
AWPF Funding: \$336,127      Completion Date: August 2001

Project Description: The intent of this project is to enhance and protect existing riparian forest along three miles of the San Pedro River. The grantee will restore native grassland communities on the near river slopes and terraces, will determine the need for mechanical stabilization measures and implement measures as needed to stabilize river banks and will re-establish native riparian vegetation in areas of defunct aquaculture ponds and agricultural fields on a site encompassing 860 acres. The grantee will also develop and demonstrate new techniques for



restoring abandoned agricultural fields to riparian habitat.

**97-045WPF: Santa Cruz Headwaters Project**

Map #: 188

Grantee: San Rafael Cattle Co.

County: Santa Cruz

AWPF Funding: \$100,445

Completion Date: Contract not yet executed

Project Description: The purpose of this project is to restore and maintain seven miles of riparian and wetland corridor of the Santa Cruz River headwaters. Fences and water developments will be constructed to control and manage livestock grazing in the riparian corridor.

**AWARDED DURING FY '99**

**98-046WPF: EC Bar Ranch Water Well Project**

Map #: 189

Grantee: James W. Crosswhite

County: Apache

AWPF Funding: \$19,800

Completion Date: March 2002

Project Description: The purpose of this project is to develop an alternative water source for livestock and wildlife in order to eliminate the need for the animals to utilize a water gap in a fenced section of Nutrioso Creek, a degraded perennial stream. This objective will be met through the drilling of two water wells, installation of solar pumps, and distribution of water to tanks.

**98-047WPF: Upper Verde Adaptive Management Unit**

Map #: 190

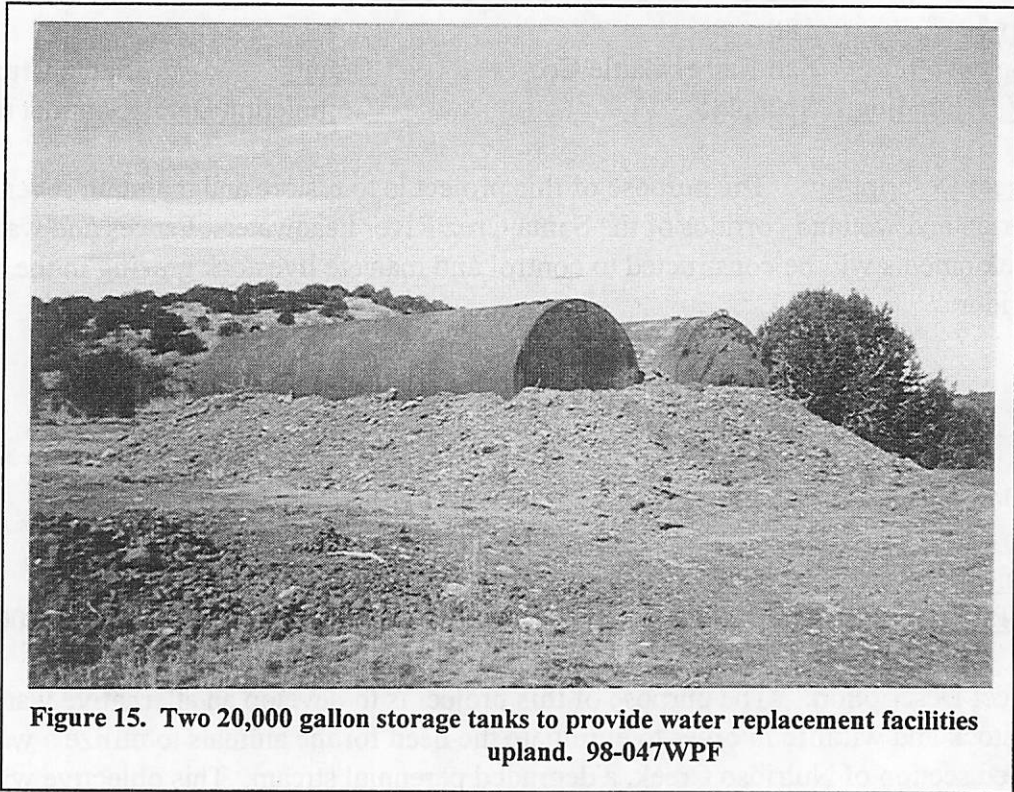
Grantee: Almida Land and Cattle Company

County: Yavapai

AWPF Funding: \$115,300

Completion Date: March 2002

Project Description: To maintain continued health of the riparian habitat along the Verde River, the Almida Land & Cattle Co., will develop a livestock grazing system that excludes cattle from the river. The project will fence-out the riparian corridor along the river and provide water replacement facilities upland. To achieve this, the grantee will build six miles of 4-strand barbed wire fencing, construct seven miles of underground pipeline, install twelve drinkers, and two 20,000 gallon storage tanks.



**Figure 15. Two 20,000 gallon storage tanks to provide water replacement facilities upland. 98-047WPF**

**98-048WPF: Verde Riparian Action Plan**

Map #: 192

Grantee: Verde NRCD

County: Yavapai

AWPF Funding: \$15,000

Completion Date: June 2002

**Project Description:** The Verde NRCD will receive \$5,000 annually for three years specifically for the rental of a backhoe and operator to dig trenches and holes for planting cottonwood and willow trees along the Verde River and its perennial tributaries. Since 1991, the Verde NRCD has maintained a riparian species nursery and each year trees are harvested and sold or planted. This project will support the NRCD Riparian Species Planting Program efforts to restore riparian habitat along the Verde River.

**98-049WPF: Empire/Cienega/Empirita Fencing Project**

Map #: 193

Grantee: Empire Ranch

County: Pima

AWPF Funding: \$58,850

Completion Date: December 2002

**Project Description:** The purpose of this project is to develop several ranch improvements in addition to improved livestock management which will benefit the health of the Cienega Creek ecosystem. These improvements include; extending an existing fence, separating sacaton

benches, creating a livestock enclosure for monitoring, realigning a degraded road, and creating an alternate wildlife/livestock water source by fitting an existing well.

**98-050WPF: Watershed Restoration of a High-Elevation Riparian Community**

Map #: 197

Grantee: Northern Arizona University

County: Coconino

AWPF Funding: \$286,275

Completion Date: August 2002

**Project Description:** The intent of this project is to modify upland watershed conditions to increase and sustain water flows into the unhealthy down slope riparian community at Hart Prairie in Northern Arizona. Previous AWPf-funded riparian restoration work at this site improved moisture conditions by successfully increasing surface discharge and groundwater storage, however monitoring results indicate incomplete recovery due to a need to address up slope watershed conditions. The grantee will conduct the following to increase and sustain water flows: reduce the density of pines encroaching the wet meadow by tree thinning and prescribed burns, construct fencing to manage grazing of large ungulates, reduce/ eliminate stock tanks, restore stream channels in the upland watershed, and continuing and expanding watershed, vegetation, stream flow and fluvial geomorphology monitoring.

**98-051WPF: Evaluation of Carex Species for Use in Riparian Restoration**

Map #: 198

Grantee: Northern Arizona University

County: Coconino

AWPF Funding: \$47,907

Completion Date: July 2001

**Project Description:** This research project will develop transplant guidelines for the use of sedges in riparian restoration projects. The grantee will 1) evaluate the performance of transplanted plugs of various sizes and species of sedges, under three different grazing regimes. 2) quantify the herbaceous species composition and arrangement, of grazed and ungrazed plant communities at two study sites. 3) evaluate the effects of water stress and grazing on transplanted plugs of sedges under greenhouse conditions. Two montane riparian study sites will be evaluated, Hoxworth Springs and Buck Springs. Each site contains healthy, functional, and degraded channel reaches. Hoxworth Springs is the site of an ongoing AWPf grant to study the performance of channel restoration work and to assess the impacts of various grazing regimes. The Buck Springs site is also in the Coconino National Forest and has been monitored from 1992 until 1996 by the Rocky Mountain Research Station.

**98-052WPF: Tritium as a Tracer of Groundwater Sources and Movement in the Upper Gila Drainage**

Map #: 200

Grantee: Arizona Geological Survey

County: Graham, Greenlee

AWPF Funding: \$41,028

Completion Date: July 2000

**Project Description:** The purpose of this project is to evaluate whether or not a radioactive isotope, tritium, can be used to distinguish between the various sources of groundwater influencing the composition (and salinity) of the Gila River. Tritium can be used to determine

the age of groundwater. This study will assess the utility of using tritium to determine the degree of mixing between deep groundwater in contact with highly soluble salts in the basin-fill sediments, and shallow groundwater – a mixture of subflow from tributaries, infiltration of Gila River water and possible infiltration of irrigation water.

**98-054 WPF: Fluvial Geomorphology Study and Demonstration Projects to Enhance and Restore Riparian Habitat on the Gila River from the New Mexico Border to the San Carlos Nation**

Map #: 203  
Grantee: Graham County County: Graham, Greenlee  
AWPF Funding: \$449,872 Completion Date: September 2002

**Project Description:** The purpose of this project is to conduct a fluvial geomorphology study of 100 miles of the Gila River from the New Mexico border to the San Carlos Nation border. This study will form the basis for the development of demonstration projects which will be implemented at optimum sites along the river to restore riparian vegetation, reduce flood velocity, and create a stable channel.

**98-055 WPF Horseshoe Allotment: Verde Riparian Project II**

Map #: 206  
Grantee: George and Sharon Yard County: Yavapai  
AWPF Funding: \$85,436 Completion Date: December 2001

**Project Description:** The grantees currently have a cattle operation on deeded and U.S. Forest Service land along the Verde River. The goal of the project is to benefit 3.75 miles of the Verde River by creating an off-river pasture through development of a currently dry pasture. This goal will be achieved through the construction of pasture division fencing, river fencing, and construction of a waterline consisting of 5 cattle drinkers, 3 small wildlife drinkers, and 2 storage tanks. This project is closely linked to two other awarded grant projects: WPF0190 and WPF0209. WPF0190 is for fencing and watering facilities on a neighboring property. WPF0209 is a grant awarded to the US Forest Service, Rocky Mountain Research Station for a feasibility study of the removal of livestock grazing from the grantees' and neighboring allotments.

**98-056 WPF Classification of Riverine Habitats of the Upper Verde River**

Map #: 207  
Grantee: Rocky Mountain Research Station County: Yavapai/Coconino  
AWPF Funding: \$44,481 Completion Date: October 2002

**Project Description:** The purpose of this project is to classify the riverine habitats of thirty (30) miles of the upper Verde River. This entails collecting data on the hydrology, geomorphology, and vegetation. It will be used to provide a quantitative description of the riparian habitats that are present, with additional descriptions of their condition and potential for restoration, enhancement, or maintenance. This project is a collaborative effort between the Prescott National Forest, grazing permittees, and the Rocky Mountain Research Station.

**98-057 WPF Upper Verde Valley Riparian Area Historical Analysis**  
Map #: 208  
Grantee: Northern Arizona University County: Yavapai  
AWPF Funding: \$44,019 Completion Date: December 2000

**Project Description:** The goal of this research project is to compare the historical riparian system of a seven mile reach along the Verde River, with the current system to determine what changes have occurred in riparian vegetation. The grantee will assess the relationships between vegetation changes and climatic factors, human land use activities, and varying groundwater levels to determine which vegetation changes were caused by human activities in the watershed. Based on the results of this study, Northern Arizona University will make recommendations for preservation, restoration, and enhancement of riparian habitat.

**98-058 WPF Effects of Removal of Livestock Grazing on Riparian Vegetation and Channel Conditions of Selected Reaches on the Upper Verde River**  
Map #: 209  
Grantee: Rocky Mountain Research Station County: Yavapai/Coconino  
AWPF Funding: \$116,500 Completion Date: September 2002

**Project Description:** The grantee will conduct a 3 year study to determine changes in riparian vegetation, channel characteristics, and selected water quality attributes resulting from the removal of livestock grazing on allotments at the headwaters of the Verde River. The objectives of the study are to (1) determine the changes in vegetation resulting from removal of livestock grazing on riparian habitats, (2) determine changes in channel geomorphology, macro invertebrates and substrates, (3) establish a long-term database, and (4) compare resultant changes in vegetation/channel attributes to available historic databases. Cattle have been removed from these allotments either voluntarily or under mandate by the Prescott National Forest.

**98-059 WPF Verde River Headwaters Riparian Restoration Demonstration Project**  
Map #: 212  
Grantee: Northern Arizona University County: Coconino  
AWPF Funding: \$148,429 Completion Date: September 2002

**Project Description:** The purpose of this project is to restore the channel and riparian vegetation Along 2600 ft. of a channelized portion of a perennial stream that flows in the Clover Springs valley. The proposed restoration area is located in the Coconino National Forest about 5.5 miles south of Clint's Well on Hwy. 87. Specific project objectives include: (1) development and implementation of a channel stabilization and wetland protection plan for the Clover Springs reach. This will include removal of existing channel structures, reshaping and redirecting the channel, and use of low impact structures to encourage natural channel stability; (2) determining the causative factors and timing of aggradation and incision in the reach of concern through investigation of past floodplain activity, radiocarbon dating and description of sediments, tree ring dating, and historic photos; (3) developing an information kiosk or signage at the site to



explain the role of meadow ecosystems, historic disturbances, current conditions, desired conditions, and restoration techniques.

**98-061 WPF Watershed Enhancement on the Antelope Allotment**

Map #: 214  
Grantee: Foremaster Revocable Trust County: Mohave  
AWPF Funding: \$137,307 Completion Date: February 2002

**Project Description:** The Antelope Allotment on the Arizona Strip consists of approximately 17,655 acres of which 40 acres is privately owned, 16,325 is Bureau of Land Management (BLM) land, and 1,300 acres of Arizona State Land Department land. The grantees will use AWPF monies to install range improvements such as a submersible pump and generator, pipeline, watering troughs for livestock and wildlife, and a water storage tank. These improvements will allow for the implementation of a grazing system consistent with the Natural Resource Conservation Service Conservation Plan and BLM Allotment Management Plan.

**98-062 WPF Partnership for Riparian Conservation in NE Pima Co. (PROPIMA II)**

Map #: 215  
Grantee: Rincon Institute County: Pima  
AWPF Funding: \$44,313 Completion Date: May 2002

**Project Description:** The grantee will work with private landowners along Tanque Verde Creek and Rincon Creek on three separate projects. The first project will use AWPF funds to design a river-friendly erosion control structure that enhances riparian vegetation reestablishment. Project intent is to stem the loss of property, encourage bank stabilization, and promote aggradation which will enhance natural regeneration. The second project involves the restoration of riparian vegetation on 2 acres of former pasture land. Funding will be used for site characterization study, fencing, seed collection and propagation of revegetation materials, irrigation line construction, and site preparation and plantings. The final project will be the implementation of long-term riparian conservation planning and public education.

**98-066 WPF Hay Mountain Watershed Rehabilitation**

Map #: 220  
Grantee: Ruth Evelyn Cowan County: Cochise  
AWPF Funding: \$116,525 Completion Date: August 2002

**Project Description:** The grantee is working in conjunction with the Natural Resource Conservation Service, the Arizona State Land Department, the Douglas Whitewater Draw Conservation District, Rocky Mountain Elk Foundation, and the Game and Fish Department to restore and rehabilitate the Hay Mountain Watershed (approximately 1000 acres) on the NI Ranch. The watershed is located northwest of Douglas in the southeastern part of the state. The site suffers from over-grazing, with reduction of native grasses and subsequent increases in overland flow. The ephemeral streams have increased width-depth ratios, increased sediment transport, and some gullying within the larger arroyos. AWPF monies will be used to install four miles of pipelines and three 10,000 gallon water storage tanks with drinkers, rip and seed native

grasses, reshape and recontour two erosion sites, and to install a variety of flood control structures. These watershed improvements are designed to reduce flooding and erosion by increasing infiltration of rainfall into the soil.

**ARIZONA WATER PROTECTION FUND**  
**Combined Statement of Receipts, Expenditures and Fund Balance**  
**From Inception July 1, 1994 Through June 30, 1999**  
(000's Omitted)

**RECEIPTS:**

Transfers In-

Appropriation From General Fund

July 1, 1994	\$4,000	
July 1, 1995	6,000	
July 1, 1996	5,000	
July 1, 1997	400	
October 1, 1997	400	
January 1, 1998	400	
April 1, 1998	400	
July 1, 1998	1,129	
October 1, 1998	1,129	
January 1, 1999	1,129	
April 1, 1999	1,129	\$21,116

Investment Income		2,970
Interstate Water Sales (CAP)		483

**EXPENDITURES:**

ADWR Support	1,407
ASLD Support	210
Commission Expenses	56

Grant Disbursements	6,172	
	<u>6,172</u>	<u>7,845</u>

FUND CASH BALANCE		<u>16,724</u>
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LESS REMAINING GRANT OBLIGATIONS*		<u>(9,600)</u>
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TOTAL		<u><u>\$7,124</u></u>
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**ACCOUNTS**

GRANT MANAGEMENT & ADMINISTRATION	1,503
COMMISSION EXPENSE AND GRANT	<u>5,621</u>

TOTAL ACCOUNTS		<u><u>\$7,124</u></u>
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\* Includes additional projects selected for 1996 Fund Cycle, contracted projects for 1998 Fund Cycle and Pre-encumbrances for 1995 and remaining 1998 Fund Cycle.