

A. Application Cover Page

Application Information

1. Title of Project: San Pedro RNCA Watershed Rehabilitation / Restoration Project

2. Type of Project:

- Water Acquisition
- Capital Project or other
- Water Conservation
- Research

3. Stream type

- Perennial
- Intermittent
- Ephemeral

4. Date Submitted: August 1, 1995

5. Date Received by ADWR: August 1, 1995
BLM Safford District

6. Applicant Name: Tucson Resource Area

7. Address (city, county, zip code)

BLM San Pedro Project Office
1763 Paseo San Luis
Sierra Vista AZ 85635
Gila

8. In an AMA

- Phoenix
- Tucson
- Prescott
- Pinal
- Santa Cruz

Outside AMA

9. Contact person/title and phone number: Ben Lomeli, Hydrologist, BLM (520) 458-3559

10. Type of application:
New (X) Continuation ()

11. Project start date: 2/1/96
End date: 7/31/97

12. Other grants obtained or will apply to for funding: None
Augmentation: ()
Partners for Wildlife ()
Heritage ()
Others _____

13. Estimated funding:
a. AWPF \$ 286,000
b. Applicant 82,982
c. Other
d. Total \$ 368,982

14. Tax ID number: PII

15. The undersigned hereby offers and agrees to perform in compliance with all terms, conditions, specifications and scope in the application. Signature certifies understanding and compliance with the attached application. The Arizona Water Protection Fund Commission may approve grant award agreements with modifications to scope items, methodology, schedule, final products, and/or budget.

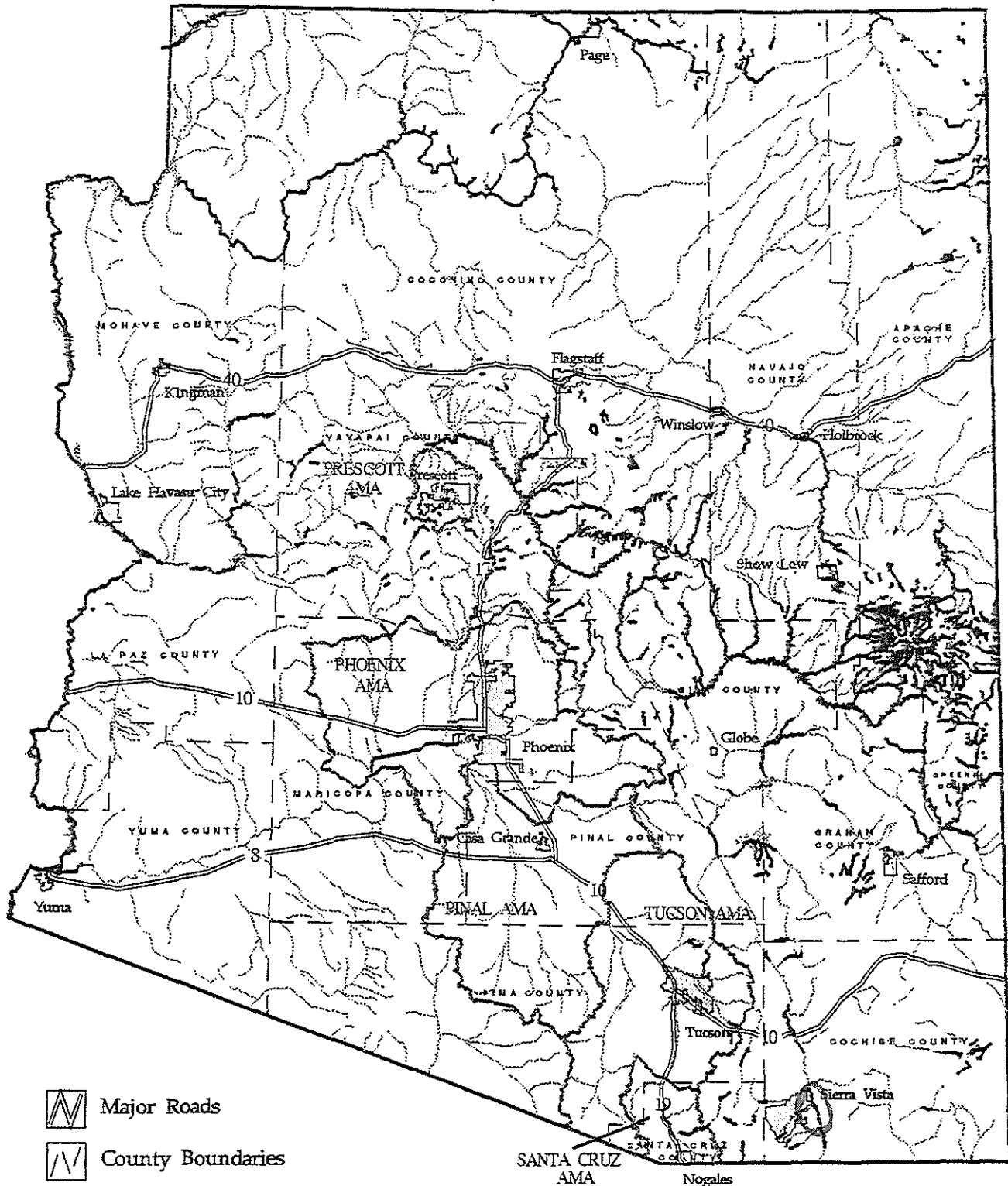
William Civish,
Typed Name of Authorized Representative






William S. Civish
Signature

District Manager, BLM Safford District (520) 428-4040
Title and Telephone No.

8/1/95
Date Signed





-  Major Roads
-  County Boundaries
-  Perennial Streams
-  Intermittent or Ephemeral Streams
-  Active Management Areas



APPLICANT NAME: BLM Safford District - Tucson RA

Circle the general location of proposed project



H. Minimum Statutory Criteria

The Arizona Water Protection Fund Commission (AWPFC) realizes that completing an application for our program will be a time consuming process. In trying to help you make sure that all statutory requirements and minimum application information requirements are met, we have devised the following two forms:

- 1) Minimum Statutory Criteria that must be satisfied; and
- 2) Application Completeness Checklist

These forms will be part of your completed application. Read through them (but don't try and complete them) before you begin any work on your application. **If your project or program does not meet all the Minimum Statutory Criteria, then it cannot be funded and will not be evaluated.** If you answer NO to any of its questions, you will have to change that portion of your project or program before it is submitted. The Application Completeness Checklist will give you a general idea of the format and types of information that the application requires. **If a form or piece of information is listed as MANDATORY, and it is applicable, it must be included or your application will not be evaluated.**

After completing your narrative proposal, revisit these two forms. Complete the forms and make sure that the minimum requirements are met and your application package is complete. This should save both you and the Commission a great deal of time and effort. If you have any questions regarding these forms, write to Arizona Water Protection Fund Commission, Arizona Department of Water Resources, 500 N. 3rd St., Phoenix, AZ 85004 (Attn: Tricia McCraw), or call (602)-417-2460.

Minimum Statutory Criteria

1. Your application does not require the acquisition of property?
YES__X__ NO____
2. Your application does not require the use of the State's right of eminent domain to acquire water or water rights?
YES__X__ NO____
3. Your application includes a description of the relationship between the project and existing plans, reports and information that are relevant to the project?
YES__X__ NO____
4. When applicable, your application includes provisions for inspection and evaluation of the project?
YES__X__ NO____
5. Your application proposes methods for the expenditure of and accounting for any monies granted by the Commission?
YES__X__ NO____
6. Your application includes a provision for the submission of all pertinent information and research gained from the project to the Commission?
YES__X__ NO____

7. Your application proposes to spend no more than 5% of the grant on the costs of administration?
YES NO
8. If a city, town, county, natural resource district, special district, or Indian community requests to work jointly with you on this project, your application states that you will work in such a fashion?
YES NO
9. Your program is located in the State of Arizona?
YES NO
10. If water is to be acquired, the water is effluent or Central Arizona Project water?
YES NO N/A
11. If your project involves water conservation, the project will occur outside of any active management area?
YES NO N/A
12. If your project is a research project, research of a similar nature has not been or is not in the process of being performed and is already available?
YES NO N/A
13. Your project does not involve the expenditure of funds for a Superfund or Water Quality Assurance Revolving Fund (WQARF) project?
YES NO
14. Your project does not violate local, state, or federal law?
YES NO
15. Your project will not contribute to water quality or quantity problems?
YES NO

I. Application Completeness Checklist

APPLICATION COMPLETENESS CHECKLIST

The purpose of this checklist is to ensure that all mandatory application requirements are fulfilled. **If specific forms or information are found to be lacking when the initial completeness review of your application is performed, the application will not be evaluated.** It is extremely important that you complete this checklist when you have finished all other portions of the application and that it is included with your submitted application package.

Form Number	Description	Mandatory (if applicable) Y/N	Completed Y/N/NA
A1	Cover page	Y	Y
A2	State map	Y	Y
	Project area outlined	Y	Y
A3	Location Information Sheet/Land ownership	Y	Y
	7.5 minute USGS map	Y	Y
	Land use/agreement documents	Y	N/A
A4	Task-Timetable	Y	Y
A5	Legal/Regulatory checklist	Y	Y
A6	SHPO information sheet	Y	Y
A7	Budget forms	Y	Y
A8	Minimum statutory requirements	Y	Y
A9	Application completeness checklist (this form)	Y	Y
	Narrative section	Y	Y
	Project experience references	Y	Y
	Letters of support	N	Y

5(a) Title

San Pedro Riparian National Conservation Area Watershed Rehabilitation / Restoration Project

5(b) Summary

The proposed project involves the rehabilitation and restoration of approximately 4,450 acres eroded ephemeral washes and uplands areas located within 1/2 to 1 mile of the San Pedro River within the San Pedro Riparian National Conservation Area (SPRNCA). The project will: demonstrate watershed rehabilitation techniques; involve the local community in hands-on watershed rehabilitation projects; and provide long term benefits by protecting, enhancing and restoring natural processes within the San Pedro River watershed and its riparian ecosystem.

Damage in the drainages to be addressed is believed to be the result of downcutting caused by poor grazing control and land development techniques that realigned natural water courses resulting in overexceedence of drainage capacity in the washes. Rehabilitation and restoration activities for these areas require: reshaping of ephemeral washes that are currently characterized by severely eroded gullies; installation of flood retardation structures (FRS's); reshaping and contour ripping of selected surrounding uplands; and reseeding and planting of reshaped ephemeral streams and upland areas (native plant species will be used for revegetation efforts). The Contention/Terranate portion of the project will involve reshaping of approximately 2.5 miles of gullied washes and installation of sequential earthen check dam/recharge basins as FRS's. The Palominas portion of the project will most likely involve realignment of a road which presently diverts flow from the bottom end of the original channel.

Rehabilitation work will be accomplished using both contracted and volunteer labor with project oversight provided by BLM hydrologic, archaeological, wildlife, and engineering staff. Members of the Border Volunteer Corps and Friends of the San Pedro will assist the BLM in coordinating local community volunteers to assist in rehabilitation efforts.

The proposal will benefit the riparian resources of the San Pedro ecosystem by protecting, enhancing and restoring natural hydrologic processes that sustain perennial or intermittent stretches of the river. The project will provide long term benefits for the San Pedro River by: slowing runoff water to increase recharge; repairing damaged landscapes; restoring native vegetative communities; and improving downstream water quality while reducing sediment yields.

A pilot project using these methods was completed in 1990 and has proven very successful. The proposed project is consistent with the final San Pedro RNCA Management Plan.

5(c) Introduction

This project involves watershed rehabilitation of 4,450 acres within the San Pedro Riparian National Conservation Area (SPRNCA). All ephemeral washes proposed for rehabilitation are located within 1/2-1 mile of the San Pedro River and function as major drainage courses for the watershed. At present, the washes proposed for rehabilitation have experienced significant downcutting resulting in severe gulling and associated erosion. (See attached photos)

Rehabilitation of these sites will provide long term benefits to the riparian resources of the San Pedro watershed through the protection, enhancement and restoration of land and water resources. Rehabilitation will provide long term erosion control, improved water recharge and quality, and an increase in native vegetation. These improvements will help negate some of the impacts from groundwater overdraft and former lack of grazing controls. Although these projects will focus on rehabilitation of ephemeral washes and surrounding uplands, the impact of these projects will be significant because the washes are located within 1 mile of the San Pedro River and serve as major drainage courses in the watershed.

One site is located in Palominas near the southern end of the SPRNCA and comprises approximately 2,850 acres. The site ranges in elevation from 4,225 above mean sea level (MSL) near where the wash joins the San Pedro River to 4,400 feet above MSL in the upland areas. The upper watershed drains the foothills and mountain slopes of San Jose Peak in Mexico. The vegetation consists creosote, mesquite, and Chihuahuan desert grassland.

Rehabilitation activities at the Palominas site will involve installation of flood retardation structures (FRS's) in the channel, possible gabion check dams, reshaping of channel banks between the proposed new FRS's and realignment of road presently diverting flow from the bottom end of the original channel. Energy dissipation with contour furrows or other means of increasing roughness coefficients will be used on the approach to the old irrigated fields at lower end along the river. Clearing of trash piles and junk auto parts will be necessary in some areas. Some contour ripping and seeding and planting of native grasses, trees, shrubs and forbs of adjoining upland areas will also be included. All plantings in upland areas and reshaped washes will be with native plants.

The second site is north of Fairbank near the Contention/Terrenate area. This area is approximately 2 miles north of Highway 82. Elevations range from 3,700 feet above MSL to 4,100 feet above MSL. Watershed problems in this area occur mainly in drainages just west of the San Pedro River. Numerous tributary washes have become deeply entrenched as the landforms (bajadas) drop from upland Creosote to the river's alluvial riparian corridor of Cottonwood/Willow galleries. The general area is only sparsely vegetated with Creosote, offering very little ground cover protection against erosion from overland flows, and the area has lost much of its productive potential.

Introduction (continued)

Rehabilitation of ephemeral washes and surrounding uplands will involve construction of about 100 FRS's, reshaping of about 2.5 miles of gulled washes, contour ripping and seeding of approximately 1,400 acres of uplands and planting of 200 acres of Mesquite and/or Willow in selected low land areas. Native species used in restoration will be the same as those described for the Palominas site.

BLM staff will oversee the technical design and implementation portion of the work, community volunteers will help with construction of flood retardation structures and revegetation efforts and hired labor will perform most of the heavy equipment work that is required for reshaping and contour ripping. This approach will insure that the work is completed in a timely manner and give community members hands-on experience in the practices of watershed rehabilitation and the ecological functions of riparian systems. BLM personnel will contribute the time required for project supervision as part of their in-kind contribution. Staff from the Border Volunteer Corps and Friends of the San Pedro will also contribute their time for volunteer recruitment and coordination as an in-kind contribution. The sites will also serve as public information and educational demonstration areas for surrounding land owners, land managers and the general public to view.

The BLM completed a pilot watershed rehabilitation project in 1990 near the Contention/Terrenate site, using the same methods proposed for these new sites. The results of that pilot project have been impressive with successful reductions in erosion, increase in water spreading, and regeneration of native plant species.

5(d) Objective

The objective of the project is to rehabilitate and restore approximately 4,450 acres uplands and 2.5 miles of severely gullied ephemeral washes which are part of key drainage areas along the San Pedro River within the San Pedro Riparian National Conservation Area.

The proposed work will help restore and enhance the natural hydrologic function and ecological processes associated with the riparian resources of the San Pedro River. Reshaping and contouring of downcut washes and uplands will decrease erosion and further downcutting and gullyng. Peak water flows will be reduced, and water velocity decreased within the washes. This will decrease damage from flooding and increase water retention and infiltration. These modifications will provide long term benefits for ground water, the riparian areas in the washes, the wildlife associated with the riparian areas, and the San Pedro watershed ecosystem.

Community member involved in the project will receive hands-on training in watershed rehabilitation methods and vegetation restoration techniques. Volunteers will also gain an understanding of the hydrological and ecological processes in riparian systems. The project areas will serve as educational demonstration areas for NRCD's, area land management agencies and the San Pedro RNCA.

5(e) Methods and Monitoring

Methods:

BLM staff will survey the sites and will mark appropriate areas. Staff engineers and hydrologist will design flood retardation structures, road modifications and contouring. BLM staff will stake areas to be worked and revegetated.

BLM's project coordinator will meet with staff from the Border Volunteer Corps and Friends of the San Pedro (a 200+ member support group for the RNCA) to outline an approach for recruitment of community volunteers and to establish a schedule for completing the project with their help. Over 5,600 hours of volunteer labor will be recruited and donated to the project. BLM staff will train and supervise all volunteers and provide the necessary small tools and equipment.

The scope of work for rehabilitation/restoration projects will be finalized by BLM's project administrator and a final materials and labor list will be forwarded to the District purchasing agent. BLM's District Administrative staff will draft bids proposals for materials, issue request for proposals for equipment and contract for labor and equipment services. Hiring of contract labor to perform heavy equipment work will insure that the project is completed in a timely manner and meets technical guidelines. Contractors will be hired to perform reshaping of washes, contour ripping of surrounding lands, to realign access roads and install culvert crossings. Better drainage from roads and less sediment yields are expected from areas where any road realignments and crossing upgrades are implemented.

A combination of hired and volunteer labor will work with BLM to install about 100 flood retardation structures (FRS's) in designed areas within the washes. The construction of the FRS's will help to slow the flow of water in these washes thus reducing erosion and increasing water retention and recharge. This will benefit the riparian habitat in the washes and the San Pedro River by decreasing severe erosion from flood events and recharging storm water into the underlying aquifer.

Contracted labor will work with BLM supervision to reshape and contour about 2.5 miles of ephemeral washes and a grand total of about 4,450 acres of surrounding uplands. Earthen check dams/recharge basins will be constructed in gullied washes, spacing and size will vary depending on the reshaping of the gully and the resulting gradient. A "stair-step" rule of thumb will be used to decide size and spacing. When finished each gully will have a gentle rolling bank appearance, and a series of low cup-shaped earthen dams sequentially spaced downstream. This approach has met with success in this area in the past.

Contour ripping and seeding of uplands will help promote ground cover revegetation by disturbing compacted soil caps, and by slowing down overland flows to allow more time for infiltration of waters that would otherwise runoff. This will increase soil moisture on-site and reduce peak flows and flooding damages downstream. Contour ripping is considered adequate ground preparation for seeding and plantings. All disturbed areas will be revegetated with native seed and plant

Methods (continued)

sources. All disturbed areas will be replanted with a combination of grasses, shrubs, forbs and where appropriate trees. Seed and plant specimens used for revegetation will be obtained either through collection of sources within the SPRNCA, from the native plant nursery at the Douglas prison or from regional native plant nurseries. Collection of seed and specimens and the majority of replanting will be done with volunteer labor. Some upland seed planting may be included as part of contracted labor. Fertilizers can be considered for better success, but has not been used in past projects here. Watering (irrigation) of newly seeded or planted areas to insure establishment can be accomplished with fire engines and tenders from firefighting fleet, but this practice has not been used in the past on the San Pedro and is not considered an essential step in the restoration of these areas.

Grasses to be used include: cane beardgrass (*Bothriochloa barbinodis*), bush muhly (*Muhlenbergia porteri*), plains bristlegrass (*Setaria macrostachya*), giant sacaton (*Sporobolus airoides*), and sideoats grama (*Bouteloua curtipendula*). Shrubs to be planted include little-leaf sumac (*Rhus microphylla*), velvet mesquite (*Prosopis juliflora velutina*), and four wing saltbush (*Atriplex canescens*). Grass and shrubs will be planted in early spring and summer and trees during the winter. Cottonwood and willow will be selectively planted in low areas in the drainage to improve the riparian habitat values of the area and help stabilize the channel. Revegetation of disturbed areas will increase surface cover and thus reduce erosion and gullyng. Planting with native species will increase the amount of native vegetation within the watershed. Revegetation efforts will be used as a community education outreach learning session for volunteers. They will learn the selection of native species and techniques for revegetation of disturbed areas.

The project is expected to take 12-18 months to complete following receipt of grant funding. Funds for operation and maintenance of the project will not be required as the sites once rehabilitated should provide a more stable hydrologic regime than presently exists at these locations.

Monitoring:

Collection of empirical and photographic data will be conducted by an interdisciplinary team consisting of San Pedro RNCA BLM staff. Ground cover transects and photo points will be used quarterly to monitor success of project for the next three to five years (depending on rate of success). Bi-monthly monitoring of groundwater levels and streamflow measurements which are already being conducted as part of the San Pedro RNCA's monitoring plan will continue and be part of the monitoring aspects of the project. Monitoring using these methods will provide an efficient and accurate assessment of project success.

Following completion of all rehabilitation and restoration work a summary of the work completed will be sent to the WPFC. This report will be compiled by BLM staff and will contain a description of work performed, empirical and photographic monitoring data, a description of the number of community members who were involved with the project and the work they performed.

5(f) Project Location and Ownership Status

All lands included in rehabilitation and restoration work are owned by BLM and located within the boundaries of the San Pedro Riparian National Conservation Area. The location of these sites are shown on the enclosed maps. BLM has legal access to all of the proposed sites.

D. Task - Timetable

Start Date: February 1, 1996 Yrs of Benefit: Long term 20+ End Date: July 31, 1997			Project Name: San Pedro RNCA Watershed Rehabilitation/Restoration Project											
Project Categories and Tasks			Months Since Project Initiated (Year 1)											
Task No.	Task Cost	Task Description	1	2	3	4	5	6	7	8	9	10	11	12
1	3,000	Site Surveys and Final Design of Flood Retardation Structures	X	X										
2	500	Organize Volunteer Work Force and Finalize Scope of Work	X	X	X	X								
3a	3,000	Complete Environmental Assessment/ Cultural Clearances & Consultation	X	X	X	X								
3b	500	Floodplain & Water Quality Permits	X	X	X	X								
4	750	Order & Receive Materials	X	X	X									
5	1,000	Develop RFP's & Issue Equipment Contracts	X	X	X	X								
6	45,000	Realign Access Roads/Install Crossings					X	X	X					
7	40,000	Construct Flood Retardation Structures				X	X	X	X	X	X	X	X	X
8	60,000	Reshape and Contour Washes and Surrounding Uplands					X	X	X	X	X	X	X	
9	24,000	Contour Ripping of Uplands						X	X	X	X			
10	180,000	Revegetation of Disturbed Areas with Native Seed and Plants						X	X	X	X	X	X	X
11	2,000	Begin Collecting Data and Vegetation Monitoring (empirical and photographic)			X	X	X	X	X	X	X	X	X	X
12	600	File Quarterly Reports w/ photos			X				X				X	

5(h) End Products and Significance of the Project

- 1) About 2.5 miles of ephemeral washes and a grand total of about 4,450 acres of surrounding uplands will be rehabilitated.
- 2) Upon completion of the project severe gulling, erosion and runoff problems from the associated washes within the RNCA will be corrected.
- 3) Native plant species populations will be increased.
- 4) Overland water flows will be slowed down to allow more time for infiltration of waters that would otherwise runoff. This will increase soil moisture on-site and reduce peak flows and flooding damages downstream.
- 5) Realigned access roads with culvert crossings will provide better drainage from roads and less sediment yields.
- 6) Community member involved in the project will be more sensitive to the impacts of erosion and gain an understanding of the hydrological and ecological processes in riparian systems.

The project will not have any negative environmental impacts and will not degrade habitat or surface or groundwater quality at off site locations. The project may disturb some unknown archaeological. BLM staff archaeologists will do preliminary surveys of the area and a 2 percent budget allowance is being requested for BLM to contract for archaeological mitigation if sites are uncovered.

5(i) Personnel

BLM personnel will be involved in the design and implementation oversight of this project. Staff hydrologist, biologist, and archeologist will be on-site during implementation. The staff hydrologist and biologist have been working together on watershed improvements projects for the last 8 years. Our hydrologist joined our staff with many years of previous experience in watershed improvement work through out the southwest. In addition, the BLM has experts in this field which can be called in from the State Office, the National Training Center, the Denver Service Center, and the Safford District Office Engineering staff to assist with this project.

E. Legal and Regulatory Compliance Checklist and Permit Descriptions

Applicants\Grantees are responsible for determining that all necessary permits that apply to their project are identified and obtained. For convenience, we have provided the following checklist consisting of some of the local, state and/or federal ordinances and laws that may be applicable to some projects. In addition, the following 3 pages provide a short narrative on the applicability of the permits. While the checklist is not all inclusive, it does provide a basic list of some permits which may potentially be required.

Applies to project:		REGULATIONS/PERMITS	Regulatory Authority
Yes	No		
LOCAL			
X		Floodplain Ordinances	County
	X	Planning and Zoning Ordinances	City and County
	X	Other	
STATE			
X		Floodplain Use Permits	ADWR
X		Water Quality Certification (Section 401)	ADEQ
	X	Aquifer Protection Permits	ADEQ
	X	Wastewater Reuse Permits	ADEQ
	X	Groundwater and Surface Water Laws	ADWR
X		State Historic Preservation Act	SHPO
	X	Special Use Permits	ASLD
X		Arizona Native Plant Laws	ADA
	X	Other	
FEDERAL			
	X	CWA (Section 402): Point Source/Stormwater Discharges	EPA/ADEQ
	X	CWA (Section 404): Dredge and Fill	COE
	X	CWA: Section 10 Rivers and Harbors Act	COE
X		Wilderness or Wild and Scenic River Acts	BLM/USFS
X		Endangered Species Act	USFWS
X		National Environmental Policy Act	BLM/USFS
	X	Special Use Permits	BLM/USFS
	X	Other	
INDIAN RESERVATIONS			
	X	Tribal Permits	
	X	Other	

FIGURE #1 VICINITY MAP

LEGEND

National Conservation Area boundary

Research Natural Area boundary

Non-Public Land

 **PROPOSED PROJECTS**

NOTE TO MAP USERS

All lands within the Riparian Conservation Area boundary are under BLM management with the exception of the shaded areas. Shaded areas represent the property rights of private land owners. The shaded areas are a general description only. For more detailed information on the National Conservation Area and its management, please check with the local BLM office.

Research Natural Areas (RNAs) are lands set aside for scientific, research, and educational purposes. RNAs do not disturb the natural features in the RNAs. Lands that have been set aside for scientific study. Use of these areas for certain, dispersed forms of recreation is allowed. Over-night use and complete closure are not permitted.



Bureau of Land Management
Office Locations

Fairbank

The office is in the northern of Fairbank on State Highway 82, east of the San Pedro River and about 8 miles west of Tombstone, Arizona.

Working Address

San Pedro Riparian National Conservation Area Office
Bureau of Land Management
Box 9454, Box 1
Maricopa, AZ 85138
702-457-2255

Safford

Safford District Office
Bureau of Land Management
425 East 4th Street
Safford, AZ 85466
602-426-4240

SCALE



LOCATION MAP

CONTENTION/TERRENATE

Fairbank

TOMBSTONE

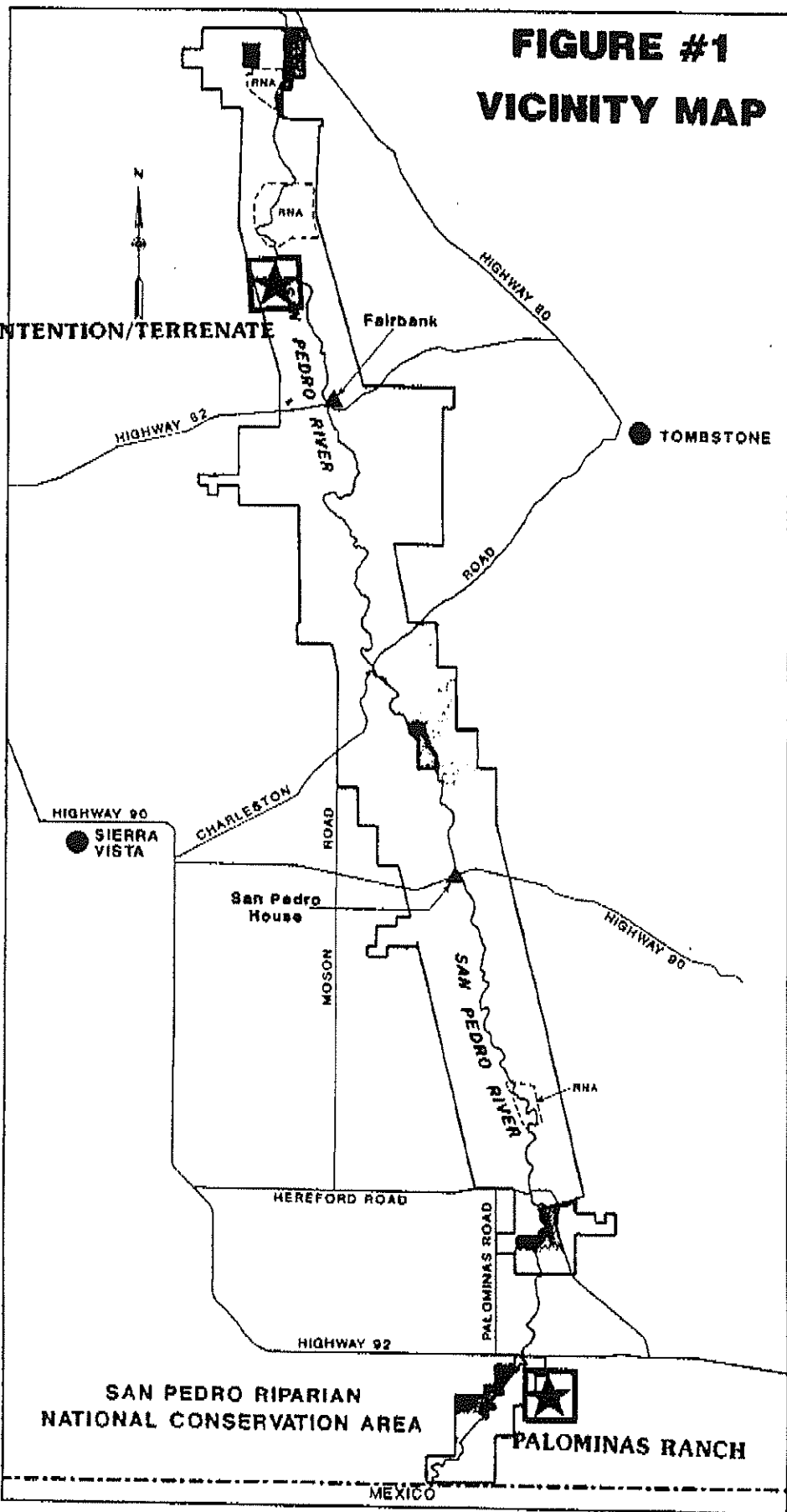
SIERRA VISTA

San Pedro House

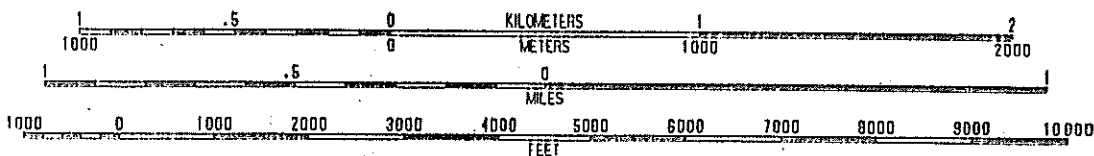
SAN PEDRO RIPARIAN NATIONAL CONSERVATION AREA

PALOMINAS RANCH

MEXICO



SCALE 1:24 000



NORTH

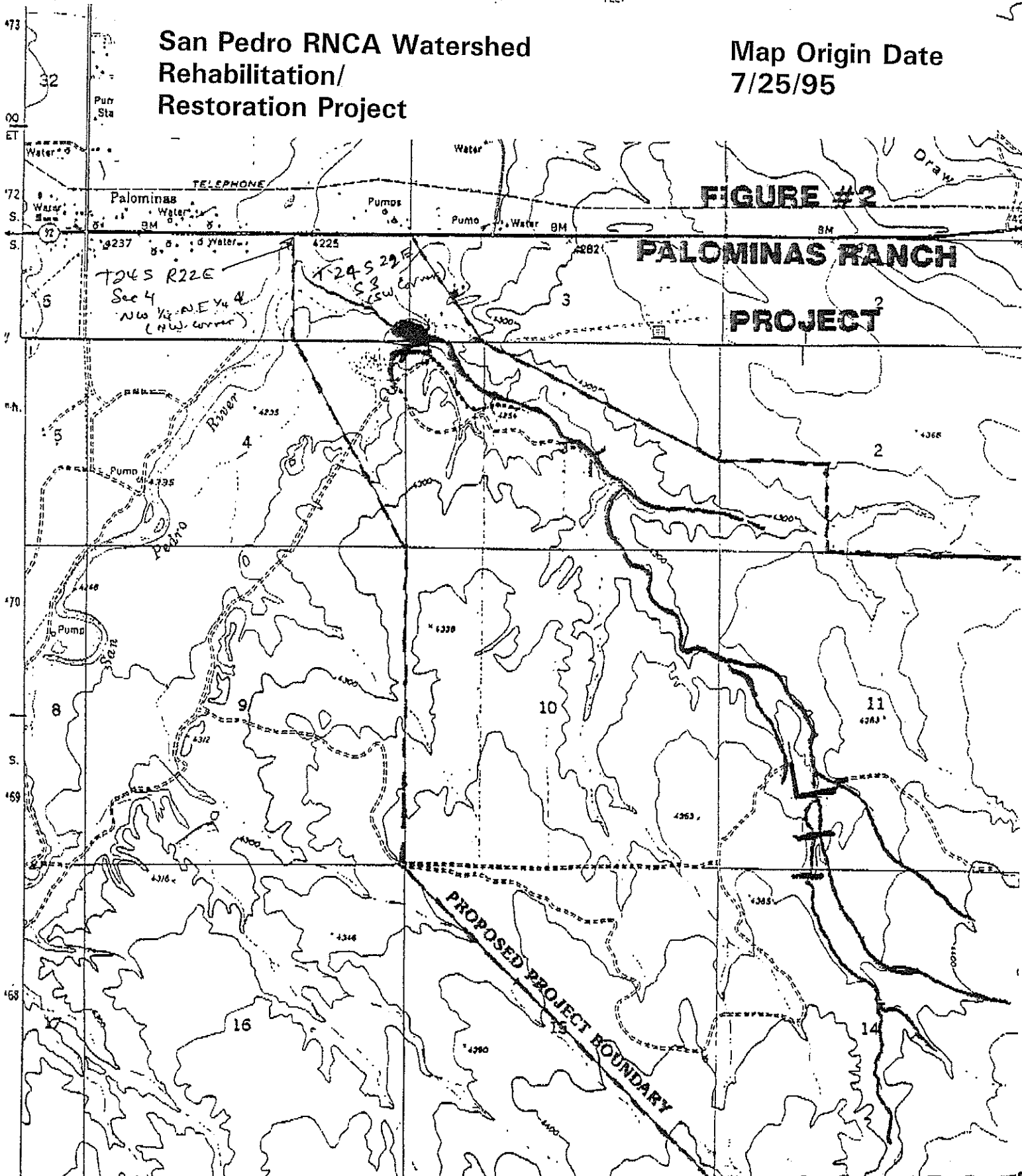
**San Pedro RNCA Watershed
Rehabilitation/
Restoration Project**

Map Origin Date
7/25/95

FIGURE #2

PALOMINAS RANCH

PROJECT



Handwritten notes: 'T24 S R22 E S 19 SE corner' with an arrow pointing to the bottom right corner.

Handwritten notes: 'T24 S R22 E S 19 SE corner' with an arrow pointing to the bottom right corner.

McGREW SPRING

LAND

**SAN PEDRO
RIPARIAN NATIONAL
CONSERVATION AREA**

PUBLIC LAW 100-608

INDEX TO 7 1/2 min.
USGS TOPOGRAPHIC MAPS

T. 18 S.

T. 19 S.

T. 20 S.

T. 21 S.

T. 22 S.

T. 23 S.

T. 24 S.

FAIRBANK

TOMBSTONE

LEWIS
SPRINGS

TOMBSTONE SE

SIERRA VISTA

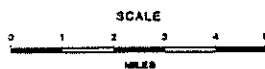
FORT HUACHUCA

NICKSVILLE

HEREFORD



LOCATION MAP



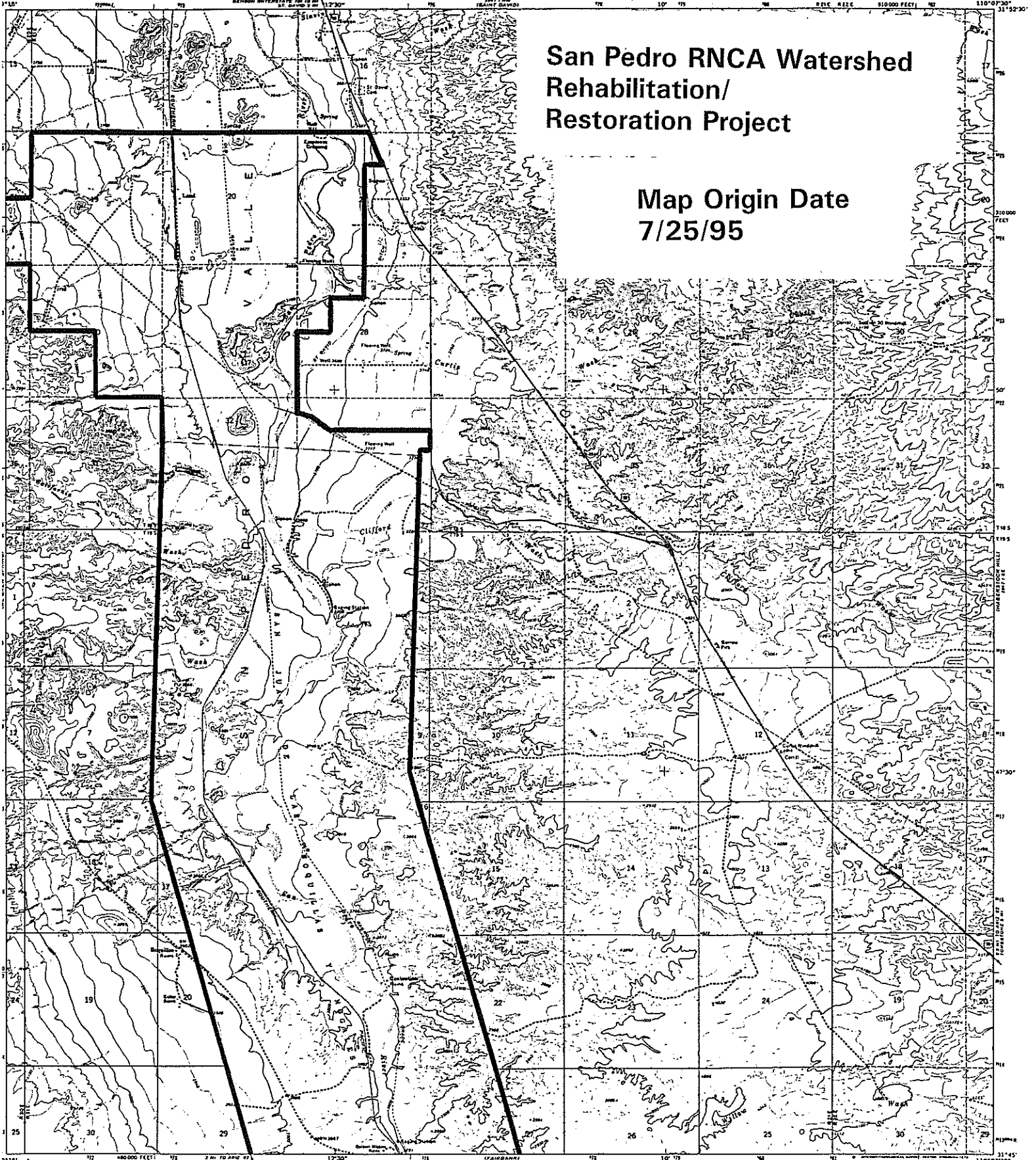
BOB THOMPSON
PEAK

STARK

U.S.A.
MEXICO

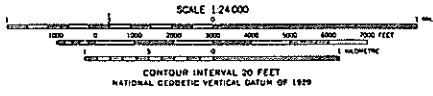
San Pedro RNCA Watershed Rehabilitation/ Restoration Project

Map Origin Date 7/25/95



Mapped, edited, and published by the Geological Survey
Control by USGS and NOS/NDA
Topography by photogrammetric methods from aerial
photographs taken 1972. Field checked 1973.
Projection and 10,000-foot grid 148; Arizona coordinate
system, east zone (Transverse Mercator)
1000-meter Universal Transverse Mercator grid cells,
zone 12, shown in black. 1927 North American datum.
Fine red dashed lines indicate selected fence lines.

1/4 IN GRID AND 1/8 IN MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

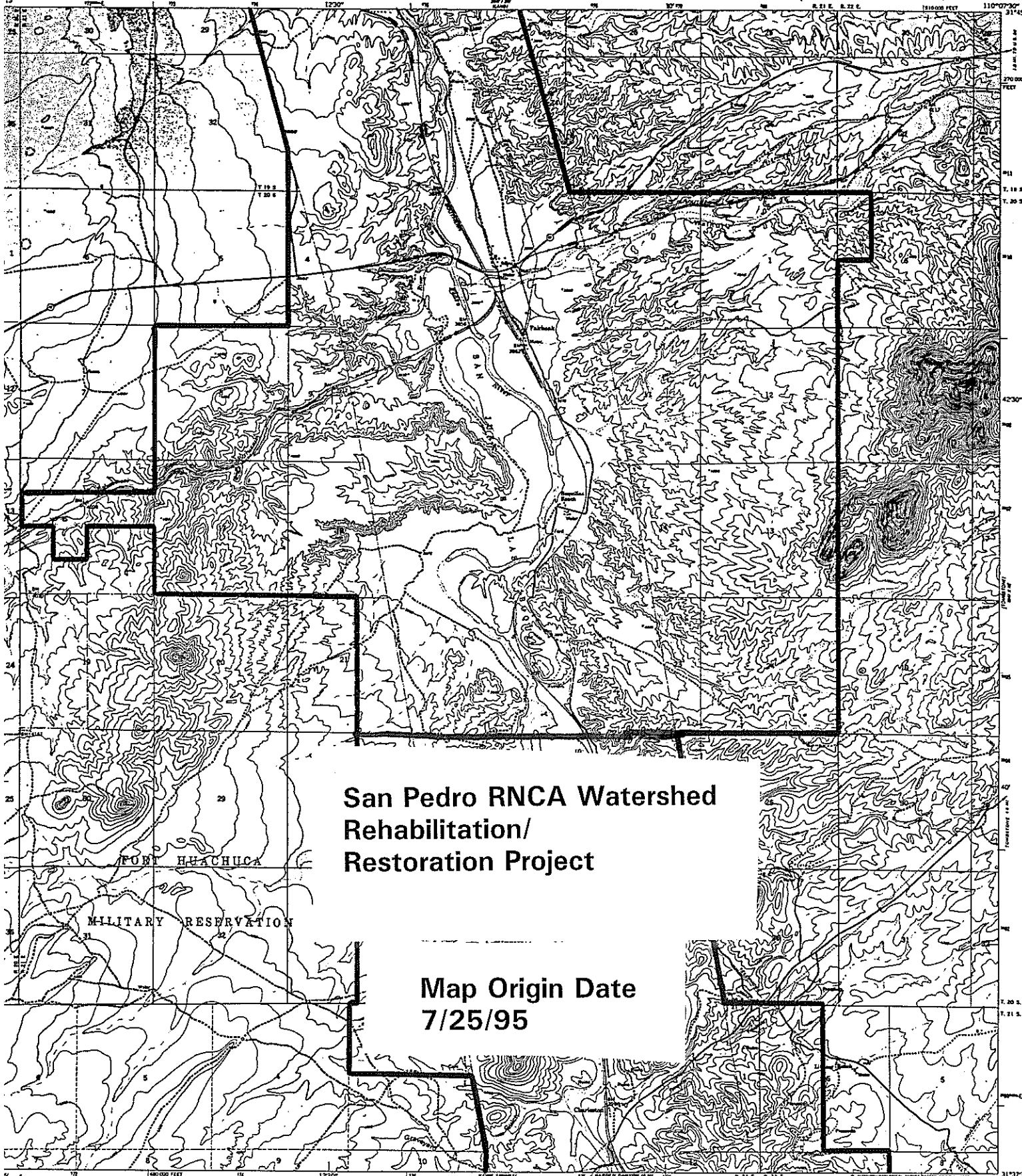


ROAD CLASSIFICATION	
Primary highway, hard surface	Light-duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road
Interstate Route	U.S. Route
	State Route



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

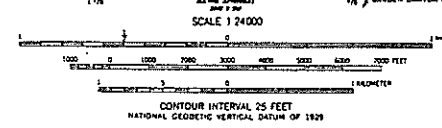
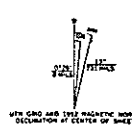
LAND, ARIZ.
SCALE BY DATUM OF QUADRANGLE
H3145-W11007 5/7.5
1973
AND PART 1 SW - SERIES 5486



San Pedro RNCA Watershed Rehabilitation/ Restoration Project

Map Origin Date
7/25/95

Approved by the Army Map Service
finished for civil use by the Geological Survey
under the authority of the Secretary of the Interior
under the authority of the Secretary of Defense
Photography from aerial photographs by photogrammetric methods
and ground control points taken 1951. Field check 1952
Cylindrical projection 1927 North American datum
1000-foot grid based on Arizona coordinate system,
1911 zone
Checked elevations are shown in brown
Shaded land lines indicate approximate locations
of water features
Dotted Universal Transverse Mercator grid cells,
4 12, shown in blue



ROAD CLASSIFICATION

Heavy-duty	ROADWAY	Light-duty
Medium-duty	ROADWAY	Unimproved dirt
	U.S. Route	State Route

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

FAIRBANK, ARIZ.
H3137 5-111007.5/7.5
1952
DMA 394 II NW-SERIES 989

F. State Historic Preservation Office Information

SHPO Certification

This certification is required by regulations implementing the State Preservation Act (A.R.S. 41-861 through 41-864), effective July 24, 1982. It is understood that recipients of state funds are required to comply with this law throughout the project period. The State Historic Preservation Act mandates that all State agencies consider the potential of activities or projects to impact significant cultural resources. Each State agency is required to consult with the State Historic Preservation Officer with regard to those activities or projects that may impact cultural resources.

PROJECT TITLE: **San Pedro RNCA Watrshed Restoration and Rehabilitation Project**

Please answer the following questions which provide information about the potential of the project to impact cultural resources:

Does the project have the potential to disturb the surface and/or subsurface of the ground?

YES: X NO:

Are there any buildings or structures (including mines, bridges, dams, canals, etc.) which are 50 years or older within the project area that have the potential to be disturbed by the proposed activity?

YES: X NO:

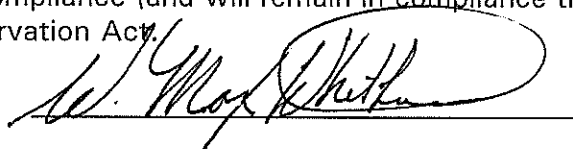
Are there any known prehistoric and/or historic archaeological sites within the project area?

YES: NO: X

Are you aware of any archeological investigations that have been performed within one (1) mile of the project area?

YES: X NO:

If you have answered "NO" to all of the above questions, please sign on the line below certifying that the activity or project is in compliance (and will remain in compliance throughout the project period) with the State Historic Preservation Act.



Authorized Signature

July 31, 1995

Date

If you have answered "YES" to any of the questions above, please answer all applicable questions on the other side of this form.

If you answered yes to question #1, specifically identify any surface or subsurface impacts that are expected. Attach extra sheets if more space is needed.

Three sites within the San Pedro RNCA are involved (see attached information on nature of the project).

If you answered yes to question #1, describe the current ground surface condition within the entire project area boundary (i.e., is the ground in a natural undisturbed condition, or has it been bladed, paved, graded, used for agriculture, etc.). Attach extra sheets if more space is needed.

The upland areas have been grazed heavily and some areas have been used for agricultural purposes. Part of the area has an old railroad right-of-ways on it. Only the bed remains in places.

If you answered yes to question #2, list the sites, their names, and provide a brief description of the site.

Historic town and silver mill site of Contention which served Tombstone in the late 1800's and the Presidio of Santa Cruz de Terrenate site which was a Spanish military outpost in 1775-1780.

Has the project area been previously surveyed for cultural resources by a qualified Archaeologist?

YES: _____ NO: X

DON'T KNOW: _____

If yes, submit a copy of the Archaeologist's report with your application.

5(f) Supplement to State Historic Preservation Office Information

All ephemeral washes proposed for rehabilitation are located within 1/2-1 mile of the San Pedro River and function as major drainage courses for the watershed. At present, the washes proposed for rehabilitation have experienced significant downcutting resulting in severe gullying and associated erosion.

One project site is located in Palominas near the southern end of the SPRNCA and comprises approximately 2,850 acres. The site ranges in elevation from 4,225 above mean sea level (MSL) near where the wash joins the San Pedro River to 4,400 feet above MSL in the upland areas. The upper watershed drains the foothills and mountain slopes of San Jose Peak in Mexico. The vegetation consists creosote, mesquite, and Chihuahuan desert grassland.

Rehabilitation activities at the Palominas site will involve: installation of flood retardation structures (FRS's) in the channel; possible gabion check dams; reshaping of channel banks between the proposed new FRS's; and possible realignment of a road presently diverting flow from the bottom end of the original channel. If realignment of the road is deemed undesirable a culvert may be placed to allow flow via the original watercourse. Energy dissipation with contour furrows or other means of increasing roughness coefficients will be used on the approach to the old irrigated fields at lower end along the river. Clearing of trash piles and junk auto parts will be necessary in some areas. Some contour ripping and seeding and planting of native grasses, trees, shrubs and forbs of adjoining upland areas will also be included. All plantings in upland areas and reshaped washes will be with native plants. Grasses to be used include: cane beardgrass (*Bothriochloa barbinodis*), bush muhly (*Muhlenbergia porteri*), plains bristlegrass (*Setaria macrostachya*), giant sacaton (*Sporobolus airoides*), and sideoats grama (*Bouteloua curtipendula*). Shrubs to be planted include little-leaf sumac (*Rhus microphylla*), velvet mesquite (*Prosopis juliflora velutina*), and four wing saltbush (*Atriplex canescens*). Whenever possible plants and seeds sources will come from harvest within the SPRNCA or will be provided by the native plant nursery program at the Douglas prison.

Grass and shrubs will be planted in early spring and summer and trees during the winter. Cottonwood and willow will be selectively planted in low areas in the drainage to improve the riparian habitat values of the area and help stabilize the channel.

The two sites north of Fairbank will be located near the Contention/Terranate area. This area is approximately 2 miles north of Highway 82. Elevations range from 3,700 feet above MSL to 4,100 feet above MSL. Watershed problems in this area occur mainly in drainages just west of the San Pedro River. Numerous tributary washes have become deeply entrenched as the landforms (bajadas) drop from upland Creosote to the river's alluvial riparian corridor of Cottonwood/Willow galleries. The general area is only sparsely vegetated with Creosote, offering very little ground cover protection against erosion from overland flows, and the area has lost much of its productive potential.

Rehabilitation of ephemeral washes and surrounding uplands will involve construction of about 100 FRS's, reshaping of about 2.5 miles of gullied washes, contour ripping and seeding of approximately 1,400 acres of uplands and planting of 200 acres of Mesquite and/or Willow in selected low land areas. Native species used in restoration will be the same as those

5(k) Community Support

The project will involve members of the local community as volunteers in watershed improvement efforts. BLM will work with members of the Friends of the San Pedro and the Border Volunteer Corps to recruit volunteers from the local community. Local organizations have offered support for the project as they believe it will provide a good example of hands-on watershed improvement practices.

Involvement of community volunteers in restoration projects will serve as a community outreach educational program. Community members involved in the project will receive hands-on training in watershed rehabilitation methods and vegetation restoration techniques. This will provide experience that can be taken off-site and utilized on other sites both on public and private lands. They will also gain an understanding of the hydrological and ecological processes in riparian systems.

Intensive community and public involvement has been solicited through public meetings and the environmental impact access process which have been an intricate part of developing the San Pedro RNCA Management Plan and the Safford District Resource Management Plan.

5(l) Existing Plans

The proposed project is consistent with the goals and objectives of the BLM San Pedro River Riparian Management Plan and if funded will be incorporated into the BLM's work plan for FY 96. It is also consistent with and supportive of many of the goals and objectives of the FY 96 Work Plan for the Friends of the San Pedro, Inc.

The project is also consistent with the Safford District Resource Management Plan and the BLM's National Riparian Area Management strategy and objective of restoring 75 percent of the agency's riparian-wetland areas to proper functioning condition by 1997.



Friends of the San Pedro River, Inc.

1763 Paseo San Luis • Sierra Vista, Arizona 85635
(602) 459-2555

July 31, 1995

John Keane, Chair
Arizona Water Protection Fund
Department of Water Resources
500 North 3rd Street
Phoenix, AZ 85004

Dear Chairman Keane:

On behalf of The Friends of the San Pedro River, Inc., (FSPR) I would like to offer our support for the BLM's watershed restoration proposal that is being submitted to the Water Protection Fund. We believe that restoration of washes within the San Pedro Riparian National Conservation Area (SPRNCA) is a priority for enhancing, protecting and maintaining the riparian resources of this area.

We currently have a Memorandum of Understanding with the BLM which allows us to work with BLM personnel within the NCA to complete mutually agreed upon projects. The FSPR were founded in 1987 to provide volunteer assistance to the BLM for restoration, enhancement and educational opportunities within the NCA. We have over 250 members and have provided thousands of volunteer hours to assist BLM within the NCA.

We will work with the BLM to provide volunteers from the community at large as well as current members of the FSPR to complete the rehabilitation and restoration work in a timely manner and meeting technical criteria. This project appears to us to be a perfect example of a way in which Water Protection Fund money can be used to enhance, restore and protect the San Pedro River and it's riparian resources.

Dorothy A. Rhodes, President





City of Sierra Vista

July 28, 1995

Mr. Ben Lomeli
Bureau of Land Management
1763 Paseo San Luis
Sierra Vista, AZ 85635

Dear Mr. Lomeli:

I've reviewed your summary report for a proposed project to rehabilitate and restore three ephemeral washes within the SPRNCA. The work is intended to rehabilitate the washes to restore natural hydrologic processes. We fully support and encourage any projects that will retard flood waters to improve the natural recharge of our groundwater supplies. We believe such activities by all landowners within the Sierra Vista Sub-watershed are essential if we are to achieve our collective goal of eliminating conflicts between the various groundwater users. Your project appears to not only protect, but also improve our water and riparian resources. We believe this meets the objectives of the Arizona Water Protection Fund as well as the goals of the local community. I commend you for your efforts.

Best regards,


GEORGE P. MICHAEL, JR., P.E.
Director of Public Works

GPM/mkp

Copy: Jim Whitlock, City Manager

WTRWPF.02/TXT/GPM

Copy: M. Tatlow

Department of Geography

Arizona State University

Box 870104

Tempe, AZ 85287-0104

602/965-7533 FAX: 602/965-8313

September 1, 1995

Ms. Tricia McCraw, Program Manager
Arizona Water Protection Fund Commission
Arizona Department of Water Resources
Program Planning and Management
500 North Third Street
Phoenix, Arizona 85004

Dear Tricia,

I have read the proposals to the commission that you recent sent to me, and offer the following thoughts. These are my initial reactions as a geomorphologist, and I suspect that they ought to be used by the commission members simply as things to think about. I did not evaluate the proposals or draw any conclusions about whether they should be approved.

003 Brawley Wash Restoration

The idea of filling in the entire arroyo by construction of dams is one that certainly would work, and there are plenty of examples elsewhere to show the results. The issue is this, however: what happens when the arroyo is filled and a new channel exists at the level of the surrounding flood plain (now a terrace)? Channel instability and lateral migration are almost a certainty, and the levees proposed as containment mechanisms are not likely to be effective. There are many examples to show that levees of this type do not contain streams, and in fact in western Arizona they are called "sugar levees" because they melt away when flows impinge on them.

A second philosophic point is worth making. The proposal seems to suggest that the objective is to re-establish the stream as it was in 1890, or thereabouts. That simply is impossible, because the surrounding landscape is not like it was a century ago. A stable channel must take on a configuration that reflects modern runoff and sediment supplies, and they are not like they were in 1890. My point is that the object should be to design a channel that is stable under present conditions, whatever they may be. Maybe this stable condition is a slowly filling arroyo with a very wide channel.

020 Short Creek Riparian Enhancement

I think this proposal is an experiment rather than a sure-fire project with predictable results. The stream is inherently unstable, and it erodes and fills within a certain width. It will be very difficult to reduce that width, because the stream has adjusted to inputs of water and sediment from the watershed in episodic flood events. I reflects present upstream controls. If we narrow the channel without altering these upstream controls, the effort will fail and the channel will re-establish its present width again.

There are two major lines of approach in the proposal: vegetation and jacks. The vegetation plantings are likely to improve riparian habitat as planned, and they may provide guides for low flows. They are also certain to be lost during flood events. This series of events is natural for streams of this type, and the episodic growth, loss, and regrowth is something we should work with rather than against. We do that by giving up fairly large widths to these unstable systems.

The use of jacks for inducing sedimentation has been successful in some cases. Taking a large perspective, it appears that jacks work best where dense riparian vegetation establishes itself and grows rapidly. These conditions produce the results described in the proposal: sediment buildup, vegetation growth, erosion resistant banks. These conditions occur on the western plains (where Kellner jacks were first used to stabilize railroad embankments) and in some larger streams in Arizona and New Mexico, such as the Rio Grande). The jacks work less well in streams where riparian vegetation grows more slowly, has to be densely planted and nurtured, and where the stream has radically fluctuating flows. An example is the Verde River at Dead Horse Ranch State Park in Cottonwood. There, a project identical to the one proposed in #020 has been 50% destroyed after only a few years, and it has not achieved its objectives. I think Short Creek is similar to the Verde example, and I think its fate would be the same.

031 Cherry Creek Drainage

This is an innovative proposal, but I think it is flawed in at least three ways. First, I am not familiar with the phrase "restoring the flow gradient." Certainly a series of check dams is not likely to restore any natural gradient for channels because the result is a series of steps, and erosion at the base of each step seems certain to occur.

Second, there seems not to be a watershed system perspective here. We can exert all the control we want on channels, but without control of conditions on the slopes that feed water and sediment to the channels, we are not likely to meet with success. Note that this is a sequential process. The slopes have to be stabilized first, and then, after several years at the very least, we can begin to work on the channels. This proposal sees it all happening simultaneously, and I don't think the system works that way. The lack of this system view enters the picture in another way, too. How much sediment is moving through the channels? Is the amount that would be stored by the check dams equal to a year's supply? a decades? one flood event? Without knowing more about the sediment budget, I

think we are working blind. The idea of building the check dams from the "top down" may make sense from some standpoints, but I invite the commission to think about the consequences for water and sediment. If we first build dams on the upper reaches, they will trap sediment and will release relatively clear water to the lower water courses. Ranchers refer to such discharges as "hungry water" because it tends to erode beds and banks to pick up new sediment to replace that which was stored by the upstream dams. Thus, the top down approach may actually cause further problems of its own.

Third, the magnitude of the project is suspect to me. Three thousand structures, even if they are small, is simply "a lot." It certainly represents a watershed interruption on a much greater scale than we have seen even in instrumented research watersheds such as Walnut Gulch in southern Arizona.

037 San Pedro RNCA Watershed Rehabilitation

Generally speaking, I think this proposal is reasonable from a geomorphic standpoint, with one major exception. There is some discussion of "reshaping" channels that are tributary to the San Pedro. This is not likely to work. The channels have the shapes they do because natural processes created them this way. The natural channel shape in a desert setting is box-like (large or small, wide or shallow), and is not like streams in Virginia, for example. Somehow, we have to accommodate this natural shape and live with the steep, occasionally unstable banks. If we shape the channel with smooth sides, flood events will simply re-introduce the steep banks. See the lower Hassayampa for a present example.

061 Teran Watershed Enhancement

This proposal is on the right track from a geomorphic perspective, but I think (as with #031) the slopes must be stabilized first, several years before the channel problems are attacked. They cannot be done simultaneously as proposed here. Fix the channels now, and problems from the slopes will foul up the process through continuing high contributions of water and sediment. The proposal also suggests using local materials for the construction of check dams. I presume this means local gravels and boulders. Extraction of these materials from the local environment will introduce instability of its own to those surfaces, and control measures would be needed to maintain stability.

Thanks for the opportunity to comment on these proposals. As critics we are always put in the position of trying to figure out what is wrong with proposals rather than the more satisfying activity of figuring out what is right. I would hope that each of these proposals has an advocate on the commission to speak to their positive aspects. Wise investment of scarce state resources makes it worth the effort.

Best wishes,



William L. Graf
Regents' Professor