

# Arizona Water Protection Fund FY 2011 Grant Application Review

Application # WPF0400 Applicant: USDI Bureau of Land Management

Title of Project: Pakoon Wash and Pakoon Springs Restoration and  
Enhancement Project

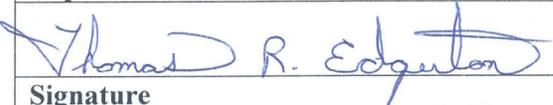
Additional materials were submitted with this application that could not be reproduced and distributed for review. These materials may be reviewed in person at the Arizona Water Protection Fund offices at (3550 N. Central Avenue, 2<sup>nd</sup> Floor, Phoenix). The additional materials available are the following:

Maps  
 Photographs  
 Disk  
 Other

WPF0400

Arizona Water Protection Fund  
Application Cover Page  
FY 2011

Water Protection Fund

<b>Title of Project:</b> Pakoon Wash and Pakoon Springs Restoration and Enhancement Project													
<b>Type of Project:</b> <input checked="" type="checkbox"/> Capital or Other <input type="checkbox"/> Water Conservation <input type="checkbox"/> Research	<b>Stream Type:</b> <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral												
<b>Your level of commitment to maintenance of project benefits and capital improvements:</b> <input type="checkbox"/> < 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 11-15 years <input checked="" type="checkbox"/> 16-20 years													
<b>Applicant Information:</b> Name/Organization: USDI Bureau of Land Management Address 1: 345 East Riverside Drive Address 2: City: St. George State: Utah ZIP Code: 84790 Phone: 435-688-3380 Fax: 435-688-3358 Tax ID No.:      EIN No.: ██████████													
<b>Inside an AMA:</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <b>If yes, which AMA:</b> <input type="checkbox"/> Phoenix <input type="checkbox"/> Tucson <input type="checkbox"/> Prescott <input type="checkbox"/> Pinal <input type="checkbox"/> Santa Cruz													
<b>Type of Application:</b> <input type="checkbox"/> New <input checked="" type="checkbox"/> Continuation													
<b>Contact Person:</b> Name: Kathleen Harcksen Title: Project Manager Phone: 435-688-3380 Fax: 435-688-3358 e-mail: Kathleen_Harcksen@blm.gov													
<b>Any Previous AWPf Grants:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <b>If yes, please provide Grant #(s):</b> 06-137WPF													
<b>Arizona Water Protection Fund Grant Amount Requested:</b>  \$ 315,168  If the application is funded, will the Grantee intend to request an advance: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Matching Funds Obtained and Secured:</b> <table border="1"> <thead> <tr> <th>Applicant/Agency/Organization:</th> <th>Amount (\$):</th> </tr> </thead> <tbody> <tr> <td>1. Applicant</td> <td>52,622</td> </tr> <tr> <td>2. USFWS</td> <td>6,269</td> </tr> <tr> <td>3. NPS</td> <td>14,000</td> </tr> <tr> <td>AGFD</td> <td>11,600</td> </tr> <tr> <td><b>Total:</b></td> <td><b>84,491</b></td> </tr> </tbody> </table>	Applicant/Agency/Organization:	Amount (\$):	1. Applicant	52,622	2. USFWS	6,269	3. NPS	14,000	AGFD	11,600	<b>Total:</b>	<b>84,491</b>
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Has your legal counsel or contracting authority reviewed and accepted the Grant Award Contract General Provisions? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A													
Signature of the undersigned certifies understanding and compliance with all terms, conditions and specifications in the attached application. Additionally, signature certifies that all information provided by the applicant is true and accurate. The undersigned acknowledges that intentional presentation of any false or fraudulent information, or knowingly concealing a material fact regarding this application is subject to criminal penalties as provided in A.R.S. Title 13. The Arizona Water Protection Fund Commission may approve Grant Awards with modifications to scope items, methodology, schedule, final products and/or budget.													
Thomas R. Edgerton	Monument Manager, Grand Canyon-Parashant National Monument, 435-688-3202												
<b>Typed Name of Applicant or Applicant's Authorized Representative</b>	<b>Title and Telephone Number</b>												
	8/26/10												
<b>Signature</b>	<b>Date Signed</b>												

## 2) EXECUTIVE SUMMARY

The project goals are to enhance and maintain Pakoon Wash through channel and stream bed stabilization and restoring/enhancing native riparian habitat, to reduce the impact of nonnative species, and to translocate two high priority native species. To achieve these goals we propose to stabilize the channel linkages between the restored springs and the rewatered perennial section of Pakoon Wash; recontour the Wash to create a braided stream to minimize the impacts of floods; plant native species to revegetate the transition area between flood plain to uplands; complete recontour and reseed of upper flood terrace, continue to remove nonnative plants, bullfrogs and fish from the project area, monitor the riparian vegetation, birds, small mammals, and aquatic insects associated with rewatered Pakoon Wash; conduct a feasibility study and up to two pilot translocations of local rare species; and develop and implement an educational trail system for the public.

Pakoon Springs, initially surveyed by Grand Canyon Wildlands Council (GCWC, 2002) through the AWPf funded Arizona Strip springs survey project (# 99-074WPF), stood out as one of the most important spring complexes and riparian habitats on the Arizona Strip, and the most promising for restoration. Located in the Mojave Desert, Pakoon Springs is one of the few large springs on the Arizona Strip and is the largest in the Grand Canyon-Parashant National Monument (GCPNM). In June 2002, the Bureau of Land Management (BLM) acquired the Pakoon Springs Ranch (240 acres) through a donation by the Richard King Mellon Foundation with assistance from The Land and Water Conservation Fund

For at least the last century, the Pakoon Springs were developed and modified to provide water for livestock, agricultural irrigation, and domestic use. Initial site clean-up and removal of the refuse --vehicles, structures, garbage, and other debris--was accomplished in March 2005, with funding obtained by the BLM. Current BLM direction for management of riparian areas on the Arizona Strip is to "Maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition for maximum long term benefits."

GCWC and BLM began implementation of the Pakoon Springs Restoration Design and Implementation Project (#06-137WPF) early in 2007. This project included the development of a Feasibility Study and Restoration Plan, as well as on-the-ground restoration of native riparian vegetation habitats, hydrologic function, hillslope spring geomorphic characteristics, floodplains, and wetlands. The Restoration Plan was implemented on a 5-10 acre area of ponds constructed by the former ranch owner and containing about 10 spring sources, as well as the adjacent riparian habitats and associated uplands. Most of the work on this project has been completed. The project was highlighted by the BLM in 2010 as the most successful conservation partnership of the Conservation Lands System. The restoration effort redirected flow into Pakoon Wash, recreating the largest perennial stream in the GCPNM. However, agricultural leveling left that channel unnaturally restricted in a narrow channel at the base of a steep slope.

The interagency relict leopard frog recovery team has identified Pakoon Springs as promising habitat for reintroduction based on the restoration effort to date and additional activities included in this proposal.

### 3) PROJECT OVERVIEW

#### Background

Pakoon Springs Ranch was a working ranch for nearly a century, with cattle ranching, alfalfa production, and ostrich farming. The landscape was severely altered by development. The ca. 10 springs were dug and developed into ponds to store water for domestic use and to irrigate agricultural fields (reference map). The springs, riparian areas, and agricultural fields were overrun by non-native, invasive plant and animal species.

Over the last five years, restoration work has been performed by the Bureau of Land Management (BLM) and Grand Canyon Wildlands Council. The structures, vehicles, refuse, and scrap metal was removed from the property by the BLM in March 2005. SHPO clearance was obtained by the BLM for the site in 2006. The current BLM direction for management of riparian areas is to “Maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition for maximum long-term benefits.”

This proposed project is to build on work accomplished under contract #06-137WP, to protect and expand the 5-10 acre pilot project. This will be accomplished by enhancing and restoring riparian, wetland and upland habitats at Pakoon Springs by continuing to remove non-native species, developing a vegetated flood plain, and restoring native species that will help return proper ecosystem function to this important area. The restoration will also provide a field site for education and interpretation for the visiting public.

#### Goals

Goal 1: To restore riparian vegetation and habitat and mitigate flood potential in Pakoon Wash through channel and stream-bed stabilization;

Goal 2: To reduce the negative impact of nonnative species;

Goal 3: To prepare for and translocate two high priority native species.

#### Objectives

Objective 1: Stabilize the channel linkages between the restored springs and the rewatered perennial section of Pakoon Wash.

Objective 2: Recontour Pakoon Wash to create a meandering stream to minimize the impacts of floods and restore riparian habitat. Complete recontouring and reseeding of upper flood terrace.

Objective 3: Continue with removal of nonnative plants, bullfrogs and fish from the project area to improve habitat for native species.

Objective 4: Monitor the riparian vegetation, birds, small mammals, and insects associated with rewatered Pakoon Wash.

Objective 5: Identify and translocate two high priority local rare species.

Objective 6: Develop and implement an educational trail system to protect wetlands and stream crossings.

### **Statement of Problem/Causes**

Pakoon Springs was developed for agricultural uses for nearly a century. As a result, natural landscape contours were removed, Pakoon Wash was channelized, invasive species were introduced, and native species were reduced or lost. From 2007- 2010 the BLM and GCWC recontoured all but one spring pond at Pakoon Springs, decommissioned roads, and re-vegetated the springs and surrounding areas. By redirecting spring flow, the project produced perennial flow in Pakoon Creek, now the longest (ca. 1 mile) perennial stream on the Grand Canyon-Parashant National Monument. A non-native invasive weed, Malta star thistle, was discovered in April 2008. A large population of Russian thistle appeared around the springs in May 2008. Although the 5 – 10 acre pilot project for Grant #06-137WPF is nearly complete, the results have provided an opportunity to further expand and enhance the amount of functional perennial stream and riparian habitat.

Since rehabilitation activities began, visitation has increased at Pakoon Springs. Potential increased public use of this very remote site has created the need for focused management of the public use to protect newly established wetlands and the perennial stream habitats and to ensure rehabilitation investments.

The introduction of exotic, invasive, and/or noxious species (both flora and fauna) occurred through time, both intentionally and accidentally. Many of these weeds colonize with disturbance and their seeds may lie dormant for many years. The rehabilitation activities of the past few years have provided a niche for some non-native, invasive plant populations to become rejuvenated and expand.

The great success of the Grant #06-137AWP provides further opportunities to expand riparian habitat and riparian transition habitat onto the adjacent uplands. Information gained from the original Pakoon Rehabilitation project will help ensure future activities are successful in meeting planned objectives.

The project site is becoming more visible from the road, as the amount of lush, bright green riparian vegetation increases, providing a stark contrast to the harsh Mojave desert habitat surrounding the project area. This lush green vegetation attracts the casual passersby, thereby increasing visitation and recreational use.

### **Statement of Solutions**

Ecosystem services and functions that can be restored by stabilizing channel linkages and recontouring Pakoon Wash include: erosion control and sediment retention, disturbance regulation, water regulation, riparian, wetland, and stream habitat restoration, and soil formation.

Removal of nonnative species and conducting feasibility studies for rare local species will provide the following benefits: create refugia for native and migratory species, recreation enhancement through wildlife viewing and hiking opportunities.

### **Statement of Project Years of Benefit**

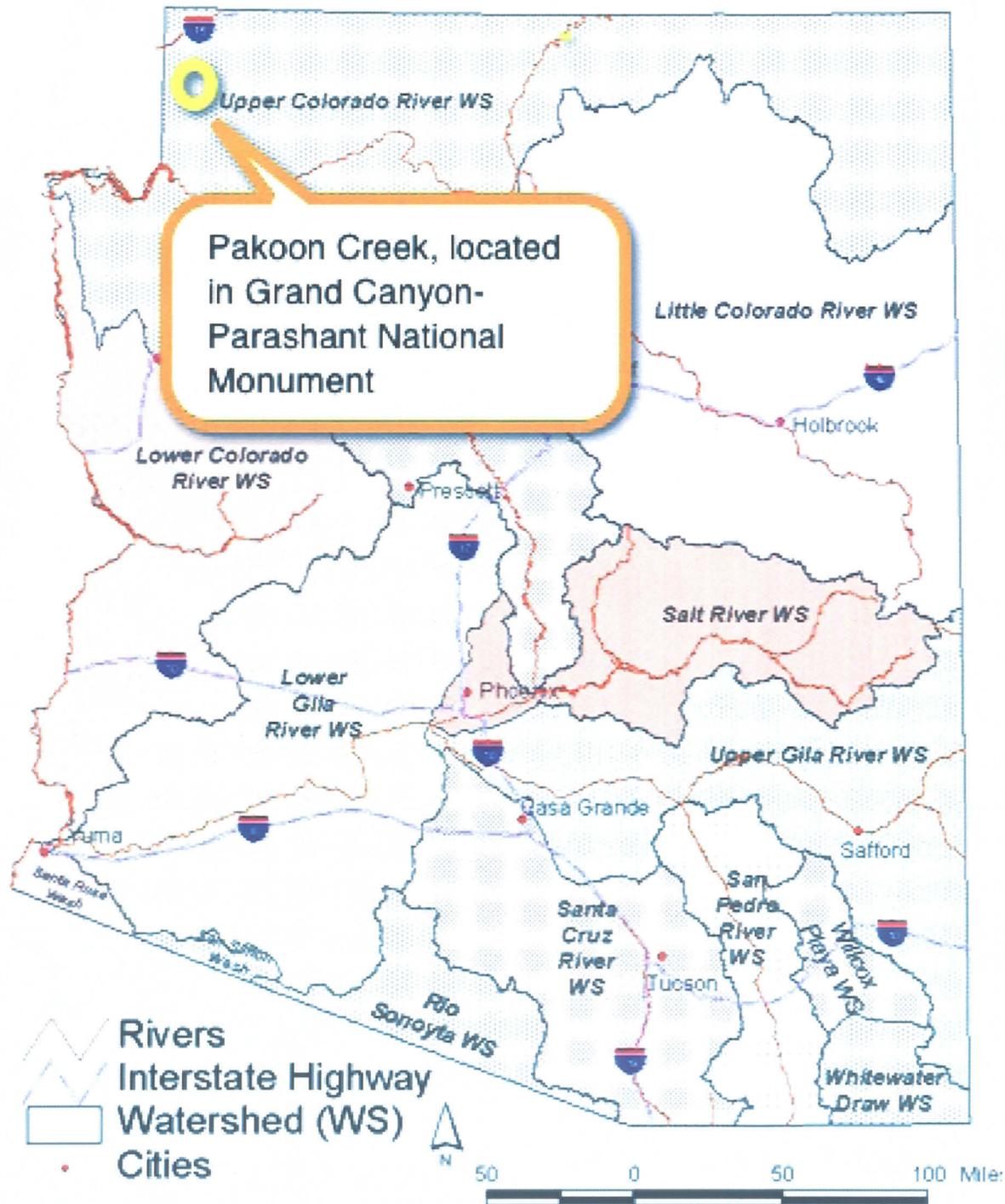
This project will benefit wildlife, education, and natural heritage of the area for 20+ years through increased development of functioning natural habitat. Also, by implementing the restoration of Pakoon Wash, Grand Canyon-Parashant National Monument will receive long-term benefits by achieving its mission to protect and restore desert riparian habitats and other resources. The BLM is committed to completing the restoration of the entire 56 acres and maintaining the improvements for 20+ years in order to ultimately fulfill the vision of complete restoration of Pakoon Springs.

Due to the fecund nature of Pakoon Springs, the area will support increased riparian habitat by the end of the grant period and offer expanded habitat for native and migratory species.

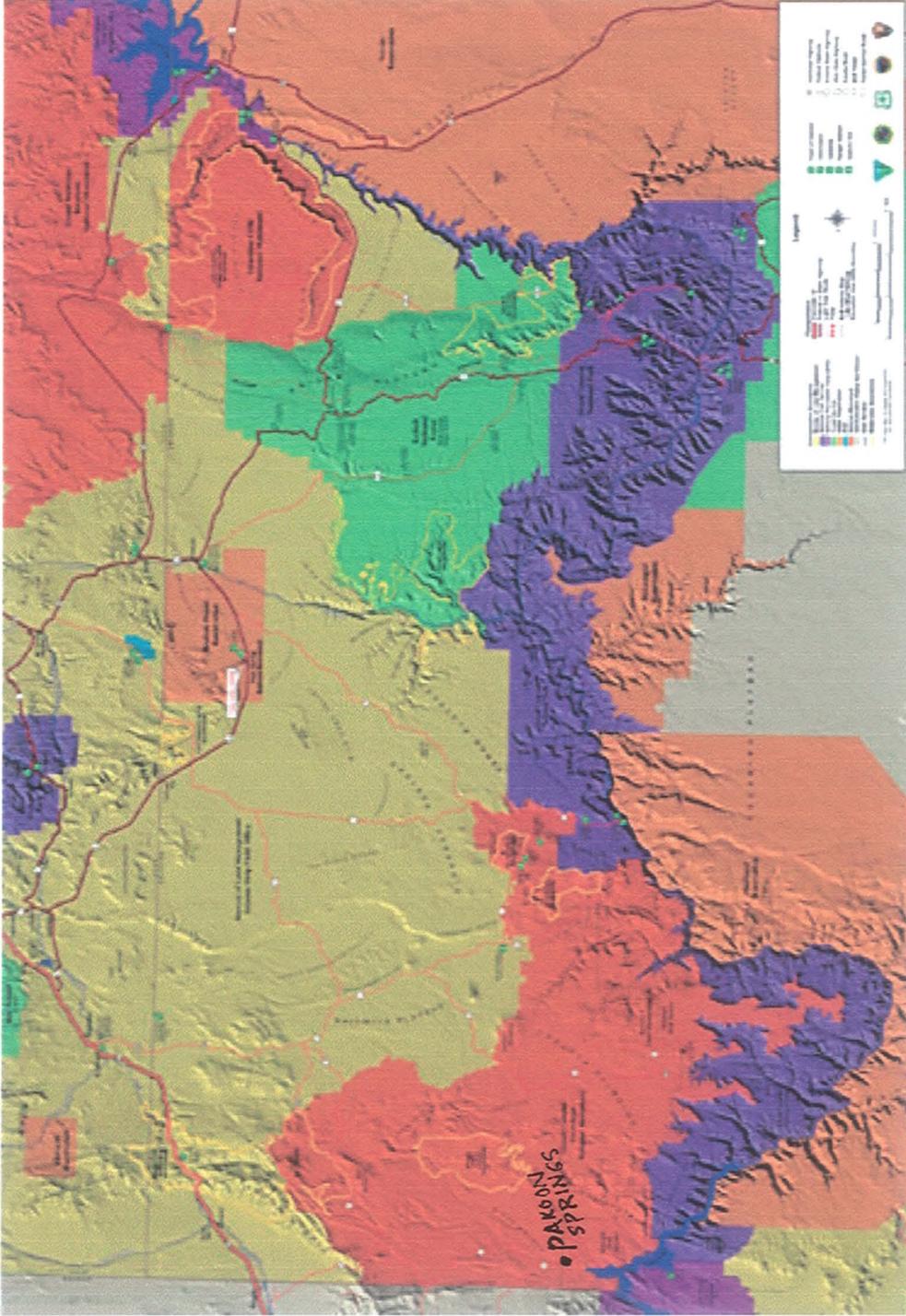
## Project Location & Environmental Contaminant Information FY 2011

<b>Project Location Information</b>			
1. County: <u>Mojave</u>	2. Section: <u>24</u>	3. Township: <u>35N</u>	4. Range: <u>16W</u>
<p>5. Watershed: <u>Upper Colorado</u></p> <p>6. 8 or 10 Digit Hydrologic Unit Code (HUC): <u>15010006</u></p> <p>7. Name of USGS Topographic Map where project area is located: <u>Pakoon Springs</u></p> <p>8. State Legislative District: <u>3</u></p> <p style="margin-left: 20px;">(Information available at:  <a href="http://159.87.126.6/mapping/default2.asp?tname=Original.2009.Legislative.Map&amp;org2009leg=on&amp;service=ircmaps&amp;init=true">http://159.87.126.6/mapping/default2.asp?tname=Original.2009.Legislative.Map&amp;org2009leg=on&amp;service=ircmaps&amp;init=true</a>)</p> <p>9. Land ownership of project area: <u>BLM</u></p> <p>10. Current land use of project area: <u>Grand Canyon - Parashant National Monument</u></p> <p>11. Size of project area (in acres): <u>240 acres</u></p> <p>12. Stream Name: <u>Pakoon Springs and Wash</u></p> <p>13. Length of stream through project area: <u>1 mile</u></p> <p>14. Miles of stream benefited: <u>10+ miles</u></p> <p>15. Acres of riparian habitat: <u>56 acres</u> will be:</p> <div style="margin-left: 100px;"> <input checked="" type="checkbox"/> Enhanced  <input checked="" type="checkbox"/> Maintained  <input checked="" type="checkbox"/> Restored  <input checked="" type="checkbox"/> Created         </div>			
<p>16. Provide directions to the project site from the nearest city or town. List any special access requirements:  <b>35 miles south of the Riverside exit on 1-15, south of Mesquite, NV. Travel approx. 20 mi on oiled road, the remainder on improved road. High-clearance vehicles recommended. Project area is located in Grand Wash on the Arizona Strip on BLM lands.</b></p>			
<b>Environmental Contaminant Location Information</b>			
<p>1. Does your project site contain known environmental contaminants? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:</p> <p>2. Are there known environmental contaminants in the project vicinity? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If yes, please identify the contaminant(s) and enclose data about the location and levels of contaminants:</p> <p>3. Are you asking for Arizona Water Protection Fund monies to identify whether or not environmental contaminants are present? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>			

# Arizona Watershed Map FY 2011

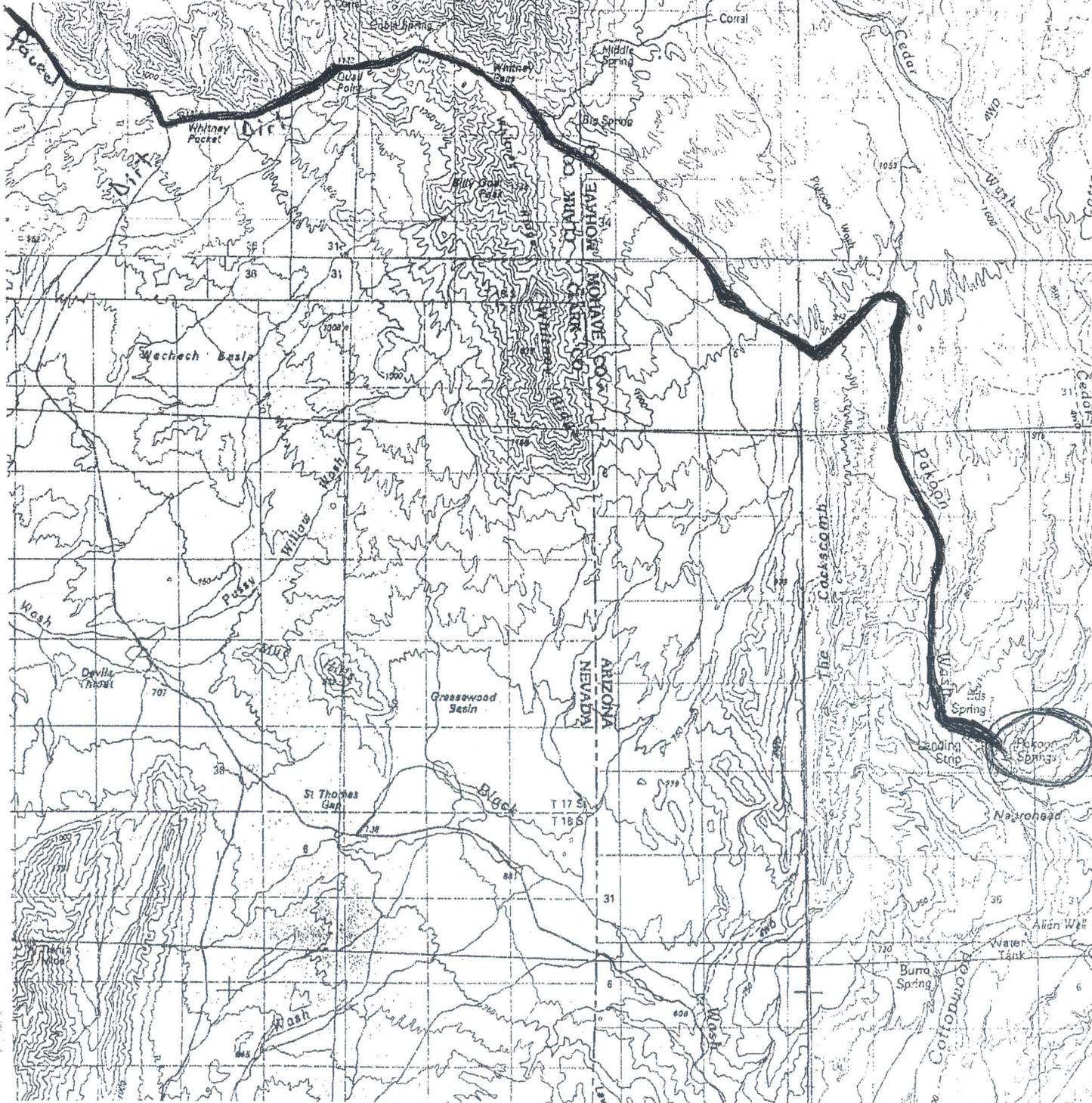


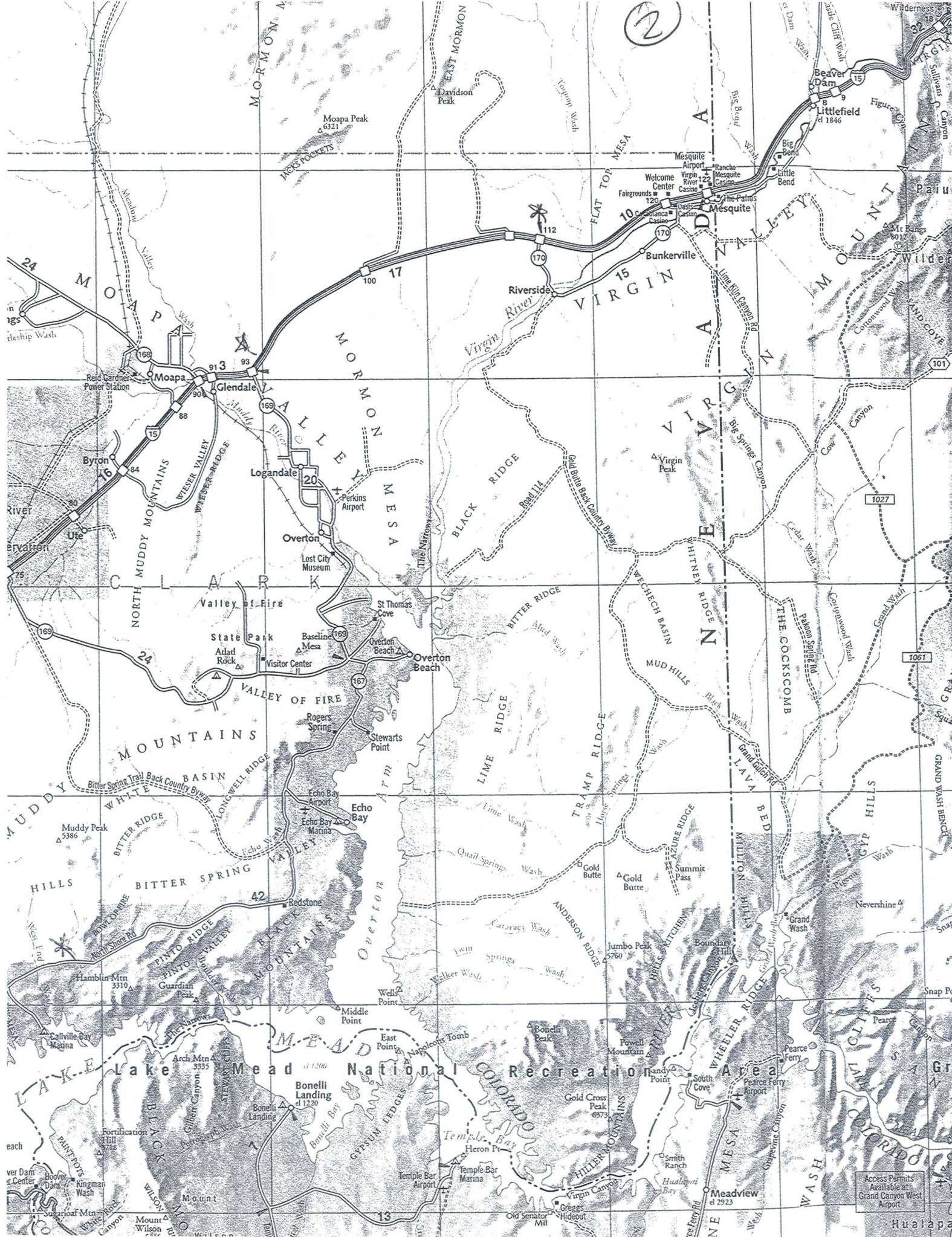
Project Title: Pakoon Wash and Pakoon Springs Restoration and Enhancement Project



8

Interstate 15 + Riverside  
≈ 20 miles





Access Permits Available at Grand Canyon West Airport

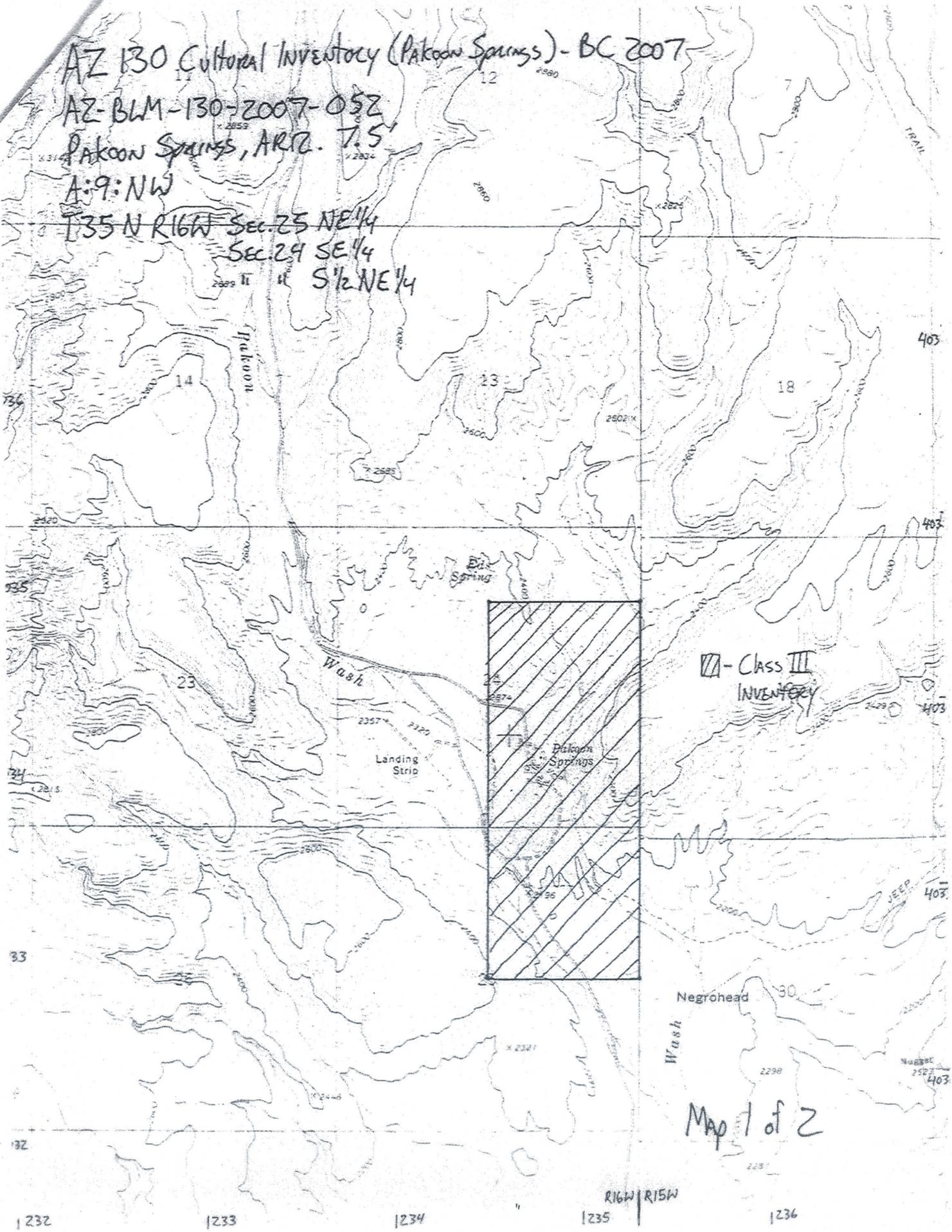
AZ 130 Cultural Inventory (Pakoon Springs) - BC 2007

AZ-BLM-130-2007-052

Pakoon Springs, ARIZ. T. 5

A: 9: NW

T35 N R16W Sec. 25 NE 1/4  
Sec. 29 SE 1/4  
S 1/2 NE 1/4



▨ - Class III INVENTORY

Map 1 of 2

1232

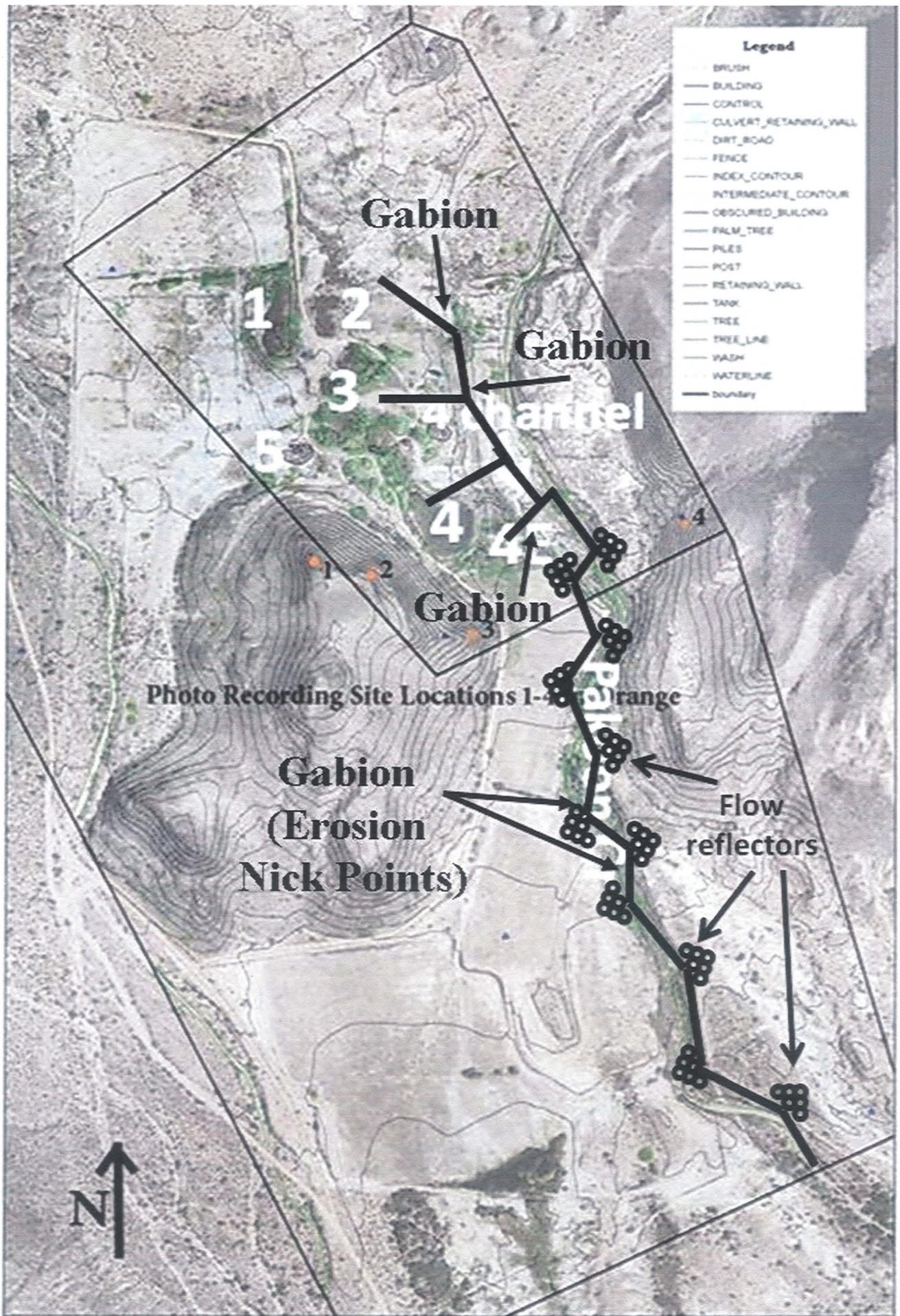
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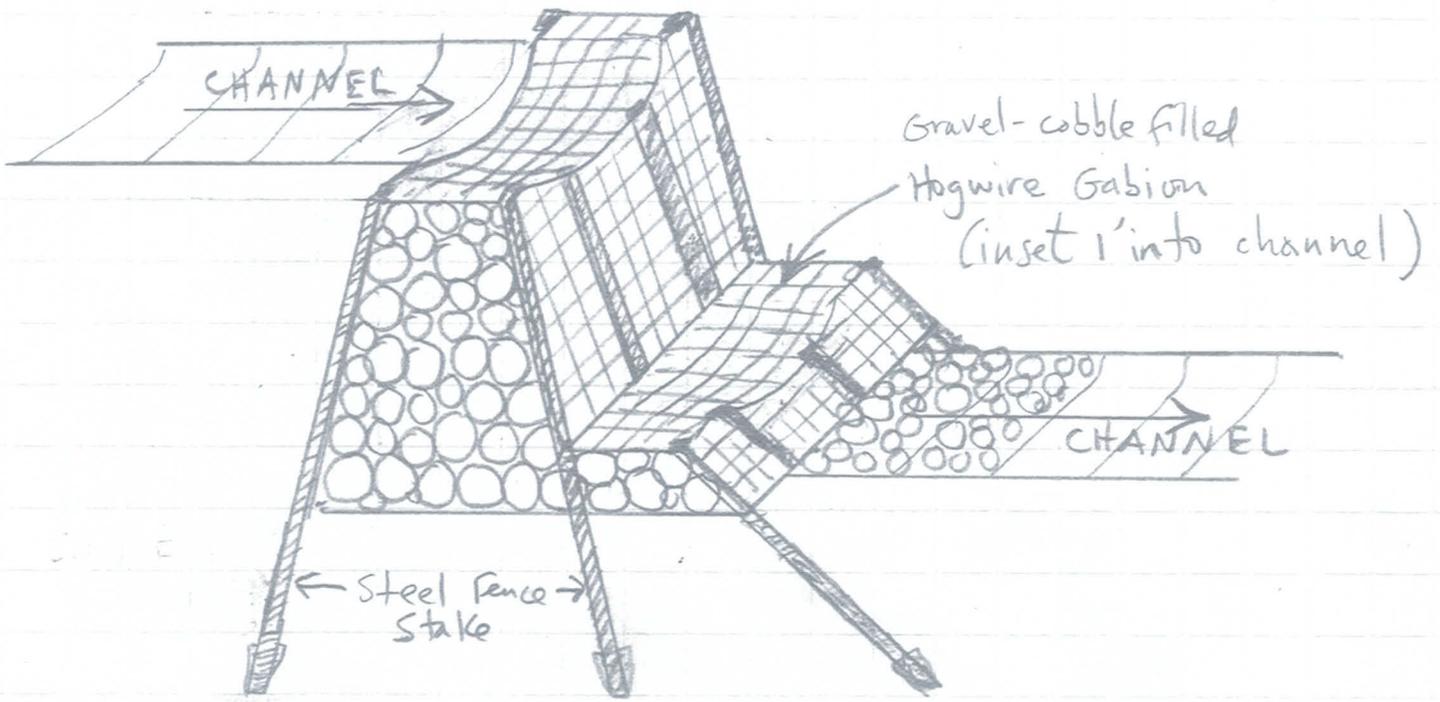
1234

1235

1236

R16W R15W





## 6) SCOPE OF WORK

### **Task 1: Permits, Authorizations, Clearances and Agreements**

**Task Description:** Conduct and document an interdisciplinary Pakoon Springs Rehabilitation Environmental Analysis (EA), Finding of No Significant Impact (FONSI), and Decision Record (DR). Develop and receive approval for the Pesticide Use Proposal (PUP). The Grantee shall obtain all permits, authorizations, environmental clearances and agreements necessary to complete the tasks listed in this Scope of Work. These include but are not limited to:

- Assistance Agreement between Grand Canyon Wildlands Council and BLM: To be completed;
- Pesticide Use Proposal: To be completed;
- National Environmental Policy Act (NEPA) compliance: To be completed;
- Quitclaim Water Right Deed: Obtained June 25, 2002;
- Donation Land Deed: Obtained June 25, 2002;
- Clean Water Act (CWA) 404 permit: COE Letter of Concurrence, February 27, 2008;
- State Historic Preservation Office (SHPO) clearance: SHPO Letter , January 19, 2007;
- Access Agreement: Not Applicable;
- Notice of Intention to Drill: Not Applicable;
- Data Collection Permits: Not Applicable.

**Purpose/objective:** To comply with all local, state and federal permit requirements; and pertinent legislation.

**Deliverable Description:** Copies of all approved permits, authorizations, clearances and agreements. Provide AWPf all necessary environmental clearances, NEPA analysis, Finding of No Significant Impact (FONSI), Decision Record (DR), prior to ground disturbance. Provide AWPf an approved copy of the Pesticide Use Proposal (PUP), prior to applying herbicides. Provide AWPf copy of COE Letter of Concurrence and SHPO clearance letter, prior to ground disturbance.

**Deliverable Due Date:** Prior to any ground disturbing activities.

**AWPF Reimbursable Cost:** \$11,183

**Task 2: Assessment of Pakoon Springs Riparian Area**

**Task Description:** Review and compile the contents of the EA and previous studies of the biological, hydrological, and geomorphological characteristics of the area to guide in the creation of plans.

**Purpose/objective:** Review and compile current site information to guide planning.

**Deliverable Description:** Pakoon Riparian Assessment Report.

**Deliverable Due Date:** 30 March 2011.

**AWPF Reimbursable Cost:** \$9,398

**Task 3: Develop plans for: Enhancing Riparian Habitat, Removal of Non-Native Invasive Aquatic Species, Identification and Translocation of Local Rare Species, Riparian Habitat Monitoring, and Visitor Education and Outreach.**

**Task Description:** Using the contents of the Pakoon Springs Assessment Report, develop plans for all subsequent tasks:

1. Implementation Plan to Expand and Enhance Riparian Habitat  
Design channel and stream-bed stabilization. Design the re-contouring of the old agriculture fields to create flood plains, including soil cut and fill, removal and/or transfer. Design re-vegetation, detailing what species shall be planted in what zones.
2. Plan to Remove Invasive Aquatic Species  
Create removal plan for bullfrogs (mature, immature, and tadpole), as well as mosquito-fish.
3. Plan to Identify and Translocate Local Rare Species  
Create plan for the identification of locally rare species, and for the translocation process and goals.
4. Plan to Monitor Riparian Habitat  
Create plan for monitoring vegetation, birds, and insects bi-annually. Design plan for a one-time small mammal inventory, to establish a baseline of present species.

5. Plan for Visitor Education, Outreach, and Footpath Construction  
Create plan for visitor outreach and educational materials. Design plan for construction of a footpath to minimize visitor impact on springs and riparian habitats with associated educational kiosks. Footpath will prevent trailing through wetland/riparian areas and provide small bridges over spring outflow.

**Purpose/objective:** Document the planning process for all tasks.

**Deliverable Description:**

1. Implementation Plan to Expand and Enhance Riparian Habitat Plan;
2. Plan to Remove Non-Native Aquatic Invasive Species;
3. Plan to Identify and Translocate Local Rare Species;
4. Plan to Monitor Flow, Geochemistry, and Riparian Habitat;
5. Plan for Visitor Education, Outreach, and Footpath Construction.

**Deliverable Due Date:**

1. 30 March 2011;
2. 30 March 2011;
3. 30 April 2011;
4. 30 April 2011;
5. 30 May 2012.

**AWPF Reimbursable Cost:** \$20,108

**Task 4: Expand and Enhance Riparian Habitat and Restore Floodplain**

**Task Description:** Using the Implementation Plan to Expand and Enhance Riparian Habitat Plan, complete all soil re-contouring activities on Pakoon Creek and adjacent areas. Re-contour the floodplain topography to match, as closely as possible, the undisturbed upstream geomorphologic condition. Stabilize spring flows from upper terraces and re-contour channels into Pakoon Wash above the travertine ledge. Reconstruct the flood plain the entire length of perennial flow in Pakoon Wash. Fill in the pools in the wash that formed due to head cutting. Place large rocks and boulders in erosion-reducing gabion structures, as well as locally sourced logs, and use the materials to create braided flow in Pakoon Wash. Fill in with smaller skeletal material and gravels.

**Purpose/objective:** Protect previous investments, expand riparian habitat, and create floodplain.

**Deliverable Description:** Report documenting all restoration activities.

**Deliverable Due Date:** 31 July 2011.

**AWPF Reimbursable Cost:** \$8,501

**Task 5: Remove Non-Native Aquatic Invasive Species**

**Task Description:** Using the Plan to Remove Non-Native Aquatic Invasive Species, remove mature bullfrogs through hunting trips with AZGF, bi-monthly from March through October, a total of four trips per year. Continue treatment of immature bullfrogs and mosquito-fish through the use of Rotenone treatment, two treatments each year in April and May, for two years.

**Purpose/objective:** To eliminate or greatly reduce the invasive species, thereby creating riparian habitat for the potential translocation of rare, threatened, or endangered local species.

**Deliverable Description:** Annual report detailing activities.

**Deliverable Due Date:** 30 November 2011, 30 November 2012, 30 November 2013.

**AWPF Reimbursable Cost:** \$47,355

**Task 6: Riparian Vegetation Enhancement Implementation**

**Task Description:** Using the Implementation Plan to Expand and Enhance Riparian Habitat Plan, remove exotic plant species: tamarisk, Russian thistle, and yellow-star thistle through combination of hand-tools and approved herbicides. Transplant riparian vegetation to Pakoon Creek. Pole plant Goodding's willow, seepwillow, and Fremont cottonwood along flood plain in zones that are from 2 to 3 feet above the water table.

**Purpose/objective:** Improve riparian vegetation, bank stabilization, water retention, and habitat improvement.

**Deliverable Description:** Annual progress reports documenting the riparian vegetation implementation.

**Deliverable Due Date:** 30 December 2011, 30 December 2012, 30 December 2013.

**AWPF Reimbursable Cost:** \$40,399

**Task 7: Identification and Prioritization of Local Rare Species Translocation**

**Task Description:** Using the Plan to Identify and Translocate Local Rare Species, perform habitat assessments, species priority ranking, and identification of local rare species populations for potential translocation into Pakoon Springs. Potential species include the Arizona toad, Pacific treefrog, relict leopard frog, and muskrat. Stakeholders from various agencies will be engaged in this process. Site visits to habitat for at least the two highest priority species, will be conducted as part of the process to fill in gaps in the published record regarding habitat requirements.

**Purpose/objective:** Pakoon Springs is potential habit for multiple locally rare native species. A formal assessment of the habitat for introduction/restoration has not been conducted. The objective of the assessment is to determine which locally rare species are the highest priority and are the best candidates for translocation to Pakoon Springs.

**Deliverable Description:** Identification and prioritization of local rare species report.

**Deliverable Due Date:** 30 April 2012.

**AWPF Reimbursable Cost:** \$22,680

**Task 8: Riparian Habitat Monitoring**

**Task Description:** Using the Plan to Monitor Riparian Habitat, riparian habitat of Pakoon Springs and Pakoon Wash will be monitored for vegetation, birds, and insects bi-annually. A one-time small mammal inventory will be conducted in the spring of 2011 to establish a baseline of what species are present.

**Purpose/objective:** To assess what species are present, their abundance and distributions in the Pakoon Springs. The results may be incorporated into future management plans and restoration efforts.

**Deliverable description:** Semiannual riparian habitat monitoring reports

**Deliverable due date:** 30 May 2011, 31 October 2011, 30 May 2012, 31 October 2012, 31 May 2013, 31 October 2013.

**AWPF Fixed Cost:** \$36,897

**Task 9: Translocation of Local Rare Species**

**Task Description:** Using the Plan to Identify and Translocate Local Rare Species and the identification and prioritization of local rare species report (above), translocate two highest priority species as determined by the assessment. Translocation will involve: capture, treatment (if necessary), release, and short term monitoring of up to two locally rare species.

**Purpose/objective:** Translocate up to two highest priority locally rare species into Pakoon Springs.

**Deliverable Description:** Translocation of local rare species report.

**Deliverable Due Date:** 30 June 2013.

**AWPF Reimbursable Cost:** \$22,969

**Task 10: Visitor Education and Outreach**

**Task Description:** Using the Plan for Visitor Education, Outreach, and Footpath Construction, create visitor educational materials, design and install informational kiosk, and implement educational outreach.

**Purpose:** Prevent non-native introductions, proliferation of trash, and the integrity of the riparian habitat to protect riparian rehabilitation investment.

**Deliverable description:** Visitor educational and outreach report.

**Deliverable due date:** 31 December 2012.

**AWPF Fixed Cost:** \$6,699

**Task 11: Construct Visitor Footpath**

**Task Description:** Using the Plan for Visitor Education, Outreach, and Footpath Construction, construct gravel visitor footpath around riparian areas to guide visitor

traffic in order to protect riparian vegetation. Construct boardwalks over flowing water and wetted soils.

**Purpose:** Protecting riparian rehabilitation investment, reduce erosion, and impacts on vegetation.

**Deliverable description:** Visitor footpath implementation report.

**Deliverable due date:** 30 June 2013.

**AWPF Fixed Cost:** \$8,684

### **Task 12: Final Report Preparation and Submission**

**Task Description:** We will prepare and submit a comprehensive final report consistent with the Final Report Guidelines in AWPF Policies and Application Guidelines Manual, including a summary of all methodologies used, outcome of all tasks, analysis of all project data, suggestions for any further changes needed in the project, and an evaluation of the project's success measured against the objectives.

**Purpose/objective:** Document the entire project funded under this grand application.

**Deliverable description:** Final report, both hard and soft copies.

**Deliverable due date:** 31 December 2013.

**AWPF Fixed Cost:** \$18,480

## Cost Proposal for Pakoon 2011-2013

Task	Item	Job Classification	Qty	Unit	Unit Cost	Total
<b>1: Permits, Authorizations, Clearances and Agreements</b>						
Outside services:						
	Project Scientist		50	hr	\$85	\$4,250
	Editor		10	hr	\$65	\$650
Direct labor costs:	Project Coordinator		50	hour	\$85	\$4,250
Other direct costs:	Office costs: printing, postage, phone, etc.		3	all	\$500.00	\$1,500
	<i>all</i>		<i>all</i>	<i>all</i>	<i>all</i>	<b>\$10,650</b>
Administrative costs 5%						\$533
<b>Total Task 1 Cost</b>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<b>\$11,183</b>

<b>2: Assessment of Pakoon Springs Riparian Area</b>						
Direct labor costs:						
	Project Coordinator		40	day	\$85	\$3,400
Outside services:	Project Scientist		40	hr	\$85	\$3,400
	Editor		10	hr	\$65	\$650
Other direct costs:	Office costs: printing, postage, phone, etc.		3	all	\$500.00	\$1,500
	<i>all</i>		<i>all</i>	<i>all</i>	<i>all</i>	<b>\$8,950</b>
Administrative costs 5%						\$448
<b>Total Task 2 Cost</b>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<b>\$9,398</b>

<b>3: Develop Implementation, Monitoring, and Outreach Plans</b>						
Direct labor costs:						
	Project Coordinator		50	day	\$85	\$4,250
Outside services:	Project Scientist		50	hr	\$85	\$4,250
	Editor		10	hr	\$65	\$650
Outside Services:	Land Survey		30	hour	\$100	\$3,000
	Aerial Survey		1	each	\$5,000	\$5,000
	Multi-layered GIS Map		20	hour	\$75	\$1,500
	Map plots, printing		1		\$500	\$500
	<i>all</i>		<i>all</i>	<i>all</i>	<i>all</i>	<b>\$19,150</b>
Administrative costs 5%						\$958
<b>Total Task 3 Cost</b>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<b>\$20,108</b>

<b>4: Expand and Enhance Riparian Habitat and Restore Floodplain</b>						
Direct Labor Costs:						
	Equipment Operators, 4 per@\$250		18	day	\$1,000	\$18,000
Outside Services:	Project Coordinator		10	day	\$400	\$4,000
	Field Workers, 4 per@\$200		18	day	\$800	\$14,400
	Technical Assistant		40	hour	\$45	\$1,800
Other Direct Costs:	Project Scientist		10	day	\$400.00	\$4,000
	Travel, vehicle rental		15	day	\$100.00	\$1,500
	Equipment Rental		18	day	\$1,400	\$25,200
	Pond Liner (45 mil EPDM, 25' x 100')		1	each	\$2,000	\$2,000
	Welded wire galvanized mesh 14 ga, 1" x 2", 72" x 100'		4	each	\$450	\$1,800
	Fuel, average 15 mpg (heavy equip also)		800	gal	\$3.00	\$2,400
	Per Diem, 4 per, 18days		72	person/day	\$35	\$2,520
	<i>all</i>		<i>all</i>	<i>all</i>	<i>all</i>	<b>\$77,620</b>
Administrative costs 5%						\$3,881

Total Task 4 Cost		all	all	all	all	all	\$81,501
<b>5: Remove Aquatic Invasive Species</b>							
Direct Labor Costs:		Project Coordinator	10	hr	\$65	\$650	
Outside Services:		Project Scientist	10	day	\$400	\$4,000	
		Field Workers, 4 per@\$200	20	day	\$800	\$16,000	
		Biologist	20	day	\$360	\$7,200	
		Biologist	20	day	\$360	\$7,200	
		Technical Assistant	20	hour	\$50	\$1,000	
Other Direct Costs:		Travel, vehicle rental	10	day	\$100	\$1,000	
		Fuel, average 15 mpg	1500	miles	\$2.90	\$4,350	
		Rotenone	20	gallon	\$80	\$1,600	
		Per Diem, 6 per, 10days	60	person/day	\$35	\$2,100	
		<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<del>\$45,100</del>	
Administrative costs 5%						\$2,255	
<b>Total Task 5 Cost</b>		all	all	all	all	<b>\$47,355</b>	

<b>6: Riparian vegetation enhancement implementation</b>							
Direct Labor Costs:		Project Coordinator	10	hr	\$65	\$650	
Outside Services:		Field Workers, 4 per@\$200	10	day	\$800	\$8,000	
		Project Scientist	5	day	\$400	\$2,000	
		Technical Assistant	5	hr	\$65	\$325	
Other Direct Costs:		Per Diem, 4 per, 10days	40	person/day	\$35	\$1,400	
		NPS Invasive Plants Team (day, inclusive \$2,500)	8	day	\$2,500	\$20,000	
		Travel, vehicle rental	10	day	\$100	\$1,000	
		Fuel, average 15 mpg	1500	miles	\$2.90	\$4,350	
		Herbicide (roundup, concentrate)	5	gallon	\$150	\$750	
		<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<del>\$38,475</del>	
Administrative costs 5%						\$1,924	
<b>Total Task 6 Cost</b>		all	all	all	all	<b>\$40,399</b>	

<b>7: Identification and Prioritization of Local Rare Species</b>							
Translocations							
Outside Services:		Workshops	6	event	\$1,200	\$7,200	
		Stakeholder Field Trips (inclusive)	8	event	\$1,200	\$9,600	
Other Direct Costs:		Synthesis	40	hour	\$85	\$4,000	
		Travel, vehicle rental	5	day	\$100	\$500	
		Fuel, average 15 mpg	100	gallon	\$3.00	\$300	
		<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<del>\$21,600</del>	
Administrative costs 5%						\$1,080	
<b>Total Task 7 Cost</b>		all	all	all	all	<b>\$22,680</b>	

<b>8: Riparian Habitat Monitoring</b>							
Outside Services:		Habitat Monitoring, 2 per@\$200	24	day	\$400	\$9,600	
		Per Diem, 2 per	24	day	\$35	\$840	
Direct Labor Costs:		Reports, 2 per year	180	hour	\$85	\$15,300	
Other Direct Costs:		Reports, 2 per year	120	hour	\$50	\$6,000	
		Travel, vehicle rental	18	day	\$100	\$1,800	
		Fuel, average 15 mpg	200	gallons	\$3.00	\$600	

Equipment: 10 additional Sherman live traps @ \$30 ea; bait, field sheets, Pesola balance (2 @ \$85/ea, etc.)				1	units	\$1,000	\$1,000
<i>Subtotal</i>	<i>all</i>			<i>all</i>	<i>all</i>	<i>all</i>	<b>\$35,140</b>
Administrative costs 5%							\$1,757
<b>Total Task 8 Cost</b>	<b>all</b>	<b>all</b>	<b>all</b>	<b>all</b>	<b>all</b>	<b>all</b>	<b>\$36,897</b>

<b>9: Translocation of Local Rare Species</b>							
Outside Services	Collect, transport, and treat species (15 days @ \$400/d)	Project Scientist	15	day		\$400	\$6,000
	Assist Project Scientist	Field Biologist	15	day		\$200	\$3,000
Direct Labor Costs:	Progress Reports (3)	Project Scientist	30	hour		\$85	\$2,550
Other Direct Costs	Progress Reports (3)	Project Coordinator	30	hour		\$65	\$1,950
	Per diem		15	person/day		\$35	\$525
	Vehicle rental		15	day		\$100	\$2,000
	Fuel, average 15 mpg		200	gal		\$3.00	\$600
	Equipment, nets, coolers, disinfectant		1	each		\$250	\$250
Outside Services	Federal and state agency crew		1	all		\$3,000	\$5,000
<i>Subtotal</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<b>\$21,875</b>
Administrative costs 5%							\$1,094
<b>Total Task 9 Cost</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>\$22,969</b>

<b>10: Visitor Education and Outreach</b>							
Outside Service Costs:	Installation of traffic counters	2 Field technicians	3	day		\$ 400.00	\$1,200
	Installation of a pedestrian counter	2 Field technicians	3	day		\$ 400.00	\$1,200
	Collecting use data	Field biologist	0.1	day		\$200.00	\$20
Direct Labor Costs:	Developing Levels of Acceptable Change (LAC) criteria	Project Coordinator	20	hour		\$65.00	\$1,300
Equipment	Traffic counter, pedestrian counter	All	1	All		\$2,000.00	\$2,000
Other Direct Costs	Per diem		6	person/day		\$35.00	\$210
	Vehicle rental		3	day		\$100	\$300
	Fuel, average 15 mpg		50	gal		\$3.00	\$150
<i>Subtotal</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<b>\$6,380</b>
Administrative costs 5%							\$319
<b>Total Task 10 Cost</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>\$6,699</b>

<b>11: Construct Visitor Education and Wetlands/Riparian Protection</b>							
Footpath	Installation of footpath and bridges	3 Field technicians	4	day		\$600.00	\$2,400
Outside Service Costs:	Report	Project Coordinator	20	hour		\$65.00	\$1,300
Direct Labor Costs:	Per diem		12	person/day		\$35.00	\$420
Other Direct Costs	Vehicle rental		12	day		\$100.00	\$1,200
	Fuel, average 15 mpg		150	gal		\$3.00	\$450
	Trail and bridge construction supplies		all	all		\$2,500.00	\$2,500
<i>Subtotal</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<i>All</i>	<b>\$8,270</b>
Administrative costs 5%							\$414
<b>Total Task 11 Cost</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>All</b>	<b>\$8,684</b>

**Task 12. Final Report**

Outside Service Costs:	Draft and final report preparation	Project Scientist	100	hour	\$85	\$8,500
		Technical Assistant	40	hour	\$65	\$2,600
Direct Labor Costs		Project Coordinator	100	hour	\$65	\$6,500
	All	All	All	All	All	\$17,600
Administrative costs (5%)						\$880
	All	All	All	All	All	\$18,480
Total Task 12 Cost						
	All	All	All	All	All	\$315,168
Total Task 12 Cost						

## DETAILED BUDGED BREAKDOWN

### Matching Funds

#### Pakoon Wash and Pakoon Springs Restoration and Enhancement Project

BLM	Qty	Unit	Rate	Total
<i>Task #4:</i>				
BLM Project Management	160	Hours	\$60.69	\$ 9,710.40
BLM Equipment Operator	160	Hours	\$39.08	\$ 6,252.80
BLM Equipment Swamper	160	Hours	\$34.61	\$ 5,537.60
BLM Dump Truck	1	Month	\$734.00	\$ 734.00
"	400	Miles	\$0.52	\$ 208.00
BLM Dozer	160	Hours	\$70.83	\$11,332.80
BLM Low Boy	200	Miles	\$0.57	\$ 114.00
BLM Crew Cab 4x4	1,000	Miles	\$0.71	\$ 710.00
BLM PU 4x4	1,000	Miles	\$53.00	\$ 530.00
<b>Sub Total</b>				<b>\$35,129.60</b>
BLM Administration	25	%		\$ 8,782.25
				<b>\$43,911.85</b>
<i>Task #5:</i>				
<b>AZG&amp;F</b>				
AZG&F Support (Non-game Specialists)	160	Hours	\$45.00	\$ 7,200.00
AZG&F Vehicles	8,000	Miles	\$0.55	\$ 4,400.00
<b>Sub Total</b>				<b>\$11,600.00</b>
BLM Administration	25	%		\$ 2,900.00
				<b>\$14,500.00</b>
<i>Task #11:</i>				
<b>SUPPLIES</b>				
Picnic Table	1	Each	\$ 1,500.00	\$ 1,500.00
<b>Sub Total</b>				<b>\$ 1,500.00</b>
BLM Administration	25	%		\$ 375.00
				<b>\$ 1,875.00</b>
<i>Task #6:</i>				
<b>NPS</b>				
Herbicide Application	320	Hours	\$45.00	\$14,400.00
<b>Sub Total</b>				<b>\$14,400.00</b>
BLM Administration	25	%		\$ 3,600.00
				<b>\$18,000.00</b>
<b>TOTAL</b>				<b>\$78,286.85</b>

## **9) Supplemental Information**

## STATE HISTORIC PRESERVATION OFFICE Review Form

In accordance with the State Historic Preservation Act (SHPO), A.R.S. 41-861 *et seq*, effective July 24, 1982, each State agency must consider the potential of activities or projects to impact significant cultural resources. Also, 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. Therefore, it is understood that **recipients of state funds are required to comply with this law** throughout the project period. All projects that affect the ground-surface that are funded by AWPf require SHPO clearance, **including those on private and federal lands.**

The State Historic Preservation Office (SHPO) must review each grant application recommended for funding in order to determine the effect, if any, a proposed project may have on archaeological or cultural resources. To assist the SHPO in this review, the following information **MUST** be submitted with each application for funding assistance:

- A completed copy of this form, and
  - A United States Geological Survey (USGS) 7.5 minute map
  - A copy of the cultural resources survey report if a survey of the property has been conducted, and
  - A copy of any comments of the land managing agency/landowner (i.e., state, federal, county, municipal) on potential impacts of the project on historic properties.
- NOTE: If a federal agency is involved, the agency must consult with SHPO pursuant to the National Historic Preservation Act (NHPA); a state agency must consult with SHPO pursuant to the State Historic Preservation Act (SHPA),
- OR**
- A copy of SHPO comments if the survey report has already been reviewed by SHPO.

### Please answer the following questions:

1. Grant Program: Capital
2. Project Title: Pakoon Wash and Pakoon Springs Restoration and Enhancement Project
3. Applicant Name and Address: Grand Canyon-Parashant NM, BLM, 435 E.Riverside Drive, St. George, UT
4. Current Land Owner/Manager(s): BLM
5. Project Location, including Township, Range, Section: 24, 35N, 16W
6. Total Project Area in Acres (or total miles if trail): 56
7. Does the proposed project have the potential to disturb the surface and/or subsurface of the ground?       YES       NO
8. Please provide a brief description of the proposed project and specifically identify any surface or subsurface impacts that are expected: We will stabilize the channel linkages between the restored springs and the rewatered perennial section of Pakoon Wash; recontour the Wash to create a meandering stream to minimize the impacts of floods; plant native species to revegetate the transition area between flood plain to uplands; continue to remove nonnative plants, bullfrogs and

fish from the project area, monitor the riparian vegetation, birds, small mammals, and aquatic insects associated with rewatered Pakoon Wash; conduct a feasibility study and up to two pilot translocations of local rare species; and develop and implement an educational trail system for the public.

9. Describe the condition of the current ground surface within the entire project boundary area (for example, is the ground in a natural undisturbed condition, or has it been bladed, paved, graded, etc.). Estimate horizontal and vertical extent of existing disturbance. Also, attach photographs of project area to document condition: The current ground condition in the project area is extensive disturbance. The entire area has been bladed, leveled, irrigated, and has grown crops. During the previous Pakoon Springs Rehabilitation Project, approximately 10 acres of the project area was recontoured.

10. Are there any known prehistoric and/or historic archaeological sites in or near the project area?  
 YES  NO

11. Has the project area been previously surveyed for cultural resources by a qualified archaeologist?  
 YES  NO  UNKNOWN

**If YES, submit a copy of the survey report. Please attach any comments on the survey report made by the managing agency and/or SHPO**

12. Are there any buildings or structures (including mines, bridges, dams, canals, etc.), which are 50-years or older in or adjacent to the project area?  YES  NO

**If YES, complete an Arizona Historic Property Inventory Form for each building or structure, attach it to this form and submit it with your application.**

13. Is your project area within or near a historic district?  YES  NO

**If YES, name of the district:**

**Please sign on the line below certifying all information provided for this application is accurate to the best of your knowledge.**

Thomas R. Edgerton /Date 1/8/26/10

Applicant Signature

Thomas R. Edgerton

Applicant Printed Name

**FOR SHPO USE ONLY**

SHPO Finding:

- Funding this project will not affect historic properties.
- Survey necessary – further GRANTS/SHPO consultation required (*grant funds will not be released until consultation has been completed*)
- Cultural resources present – further GRANTS/SHPO consultation required (*grant funds will not be released until consultation has been completed*)

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
ARIZONA STATE OFFICE  
CULTURAL RESOURCE COMPLIANCE DOCUMENTATION RECORD

**Project No:** BLM- 130 -2007- 052 **Project Name:** AZ 130 Cultural Inventory (Pakoon Springs)

EA, Job or Case File No.:

Institution: BLM

Cultural Resource Use Permit No:

**Inventory Method:**  Existing Data Review  Class II  Class III

**Eligibility Recommendation (for sites located):**

No Cultural Properties present

Not-eligible sites (list site numbers): AZ A:9:1, 9 (BLM) ; 140, 155, 158, 160 (ASM)

Eligible sites (list site numbers): AZ A:9:10 (BLM) ; 153, 154, 156, 157, 159, 161, 162, 163 (ASM)

**Effect Recommendation (only on eligible sites from above):**

No Properties Affected  No Adverse Effect  Adverse Effect

**Treatment Recommendations:** (check and attach full description and map(s) as needed):

Avoidance (by project redesign/cancellation, etc.)

Physical or administrative protection measures

Standard stipulations

Special stipulations

Data recovery (collection, excavation, detailed recording, etc.)

**Consultation:** None required

Covered under PA, no further consultation required with SHPO or ACHP

Consultation required:  SHPO  Advisory Council  Native Americans

**Comments**

The testing of the non-eligible site A:9:1(BLM) covered in separate report.

**Attachments:** CRPR, standard stipulations, maps

Signed (by archaeologist):



Date: 3/15/2007

(June 1999)

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
ARIZONA STATE OFFICE

CULTURAL RESOURCE PROJECT RECORD

Project Number: BLM -130-2007-052

Other No.: None

Project Name: AZ 130 Cultural Inventory (Pakoon Springs)

BLM Case File No.: None

State: AZ / CA County: Mohave Map Name(s): Pakoon Springs, AZ 7.5'

T35N, R16W, Section 24, SE4 and S2 of NE4

T35N, R16W, Section 25, NE4

T\_\_N, R\_\_W, Section

ASM Quad No(s): AZ A:9:NW

Land Owner(s):  Federal  County  Other  Private  State  Unknown

Agency: BLM and Arizona Strip District Office and Grand Canyon-Parashant NM

Institution Doing Work: BLM

Person(s)-in-Charge: David Van Alfen

Purpose of Project and Applicant: Non Section 106 Inventory (BC)

Dates of Fieldwork: 1 / 18 / 200 to 3 / 18 / 200 Total Person Days Used: 20

Cultural Resource Use Permit No.: NA

Access and Location Description: see attached map

Bibliographic Reference(s) (list report title, author, institution and date):

Schroeder 1955 "Archeology of Zion Park", U.U.A.P. No.22

Number of Cultural Properties Recorded: 15 List Site Numbers: AZ A:9:1,9,10 (BLM) ;140,153-163 (ASM)

Collections Made:  YES  NO

Testing Done:  YES  NO

Repository Name and Location: Southern Utah University Archaeology Repository

Photos  YES  NO

Photo Information: All digital photos included on CD in project folder

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
ARIZONA STATE OFFICE  
CULTURAL RESOURCE PROJECT RECORD

Project Number: BLM - 130 - 2007 - 052

INVENTORY TECHNIQUES (if different parts of the project used different techniques, fill out a separate page for each):

Size of Entire Project Area (acres): 400

Crew Size: 1

Project Boundary Description: T35N, R16W, Sec.25,NE4; Sec.24,SE4 & S2,NE4

Mode: Pedestrian Dimensions (miles or feet): .5 mile E-W, 1.25 miles N-S

Inventory Level (check): Class II\*  Class III  Judgmental\*

Actual Acres Surveyed - Estimated Percent Coverage: 400 acres- 100%

Field Methods Used (for example, systematic 30 meter-wide parallel transects, etc.):

Systematic 20m parallel transects

Discussion (justify techniques and methods used):

Intensive, Class III inventory

\*SAMPLING INFORMATION

Sampling Strategy (check): Systematic , Random , Stratified , Combination

Percent of Project Area Sampled: \_\_\_\_\_%

Size of Sample Units: \_\_\_\_\_ Number of Sample Units:

ENVIRONMENTAL DATA (optional if covered in report or other document):

Major Topographic Features and Locations: Project area encompasses mesa tops, steep slopes, basalt knolls, and alluvial plain

Water Sources and Locations: Pakoon Spring, center of survey area

Other: None

Form Completed By: David Van Alfen (GCPNM) Date: 3 / 18 / 2007

Approved By: \_\_\_\_\_ Date: \_\_\_/\_\_\_/\_\_\_

**Attach map(s) showing site locations, site numbers, project area boundary, all areas surveyed, and sample units and numbers, if applicable(Zerox(es) of topographic map appropriately labeled**

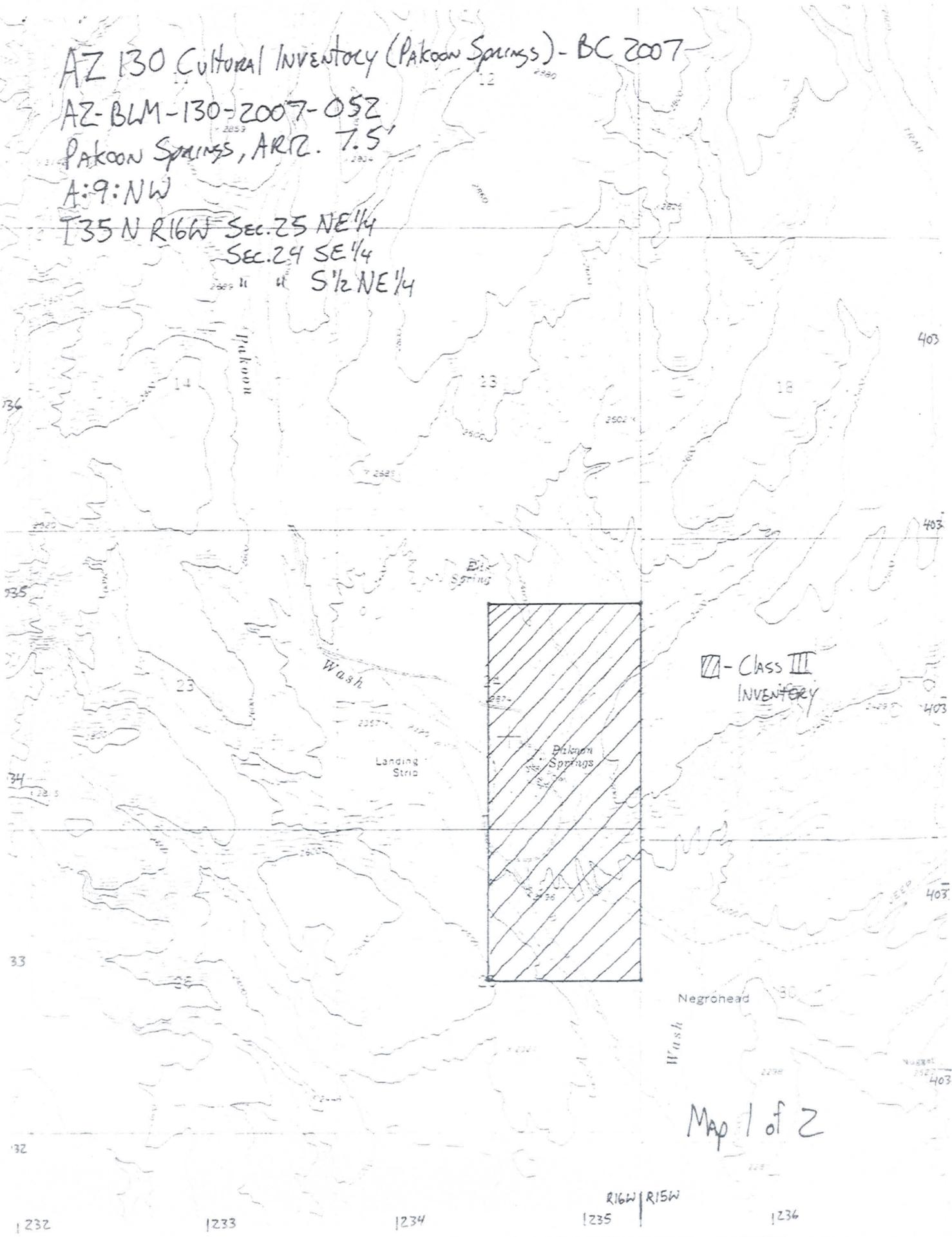
AZ 130 Cultural Inventory (Pakoon Springs) - BC 2007

AZ-BLM-130-2007-052

Pakoon Springs, ARIZ. T.5N

A:9:NW

T35N R16W Sec. 23 NE 1/4  
Sec. 24 SE 1/4  
" " S 1/2 NE 1/4



▨ - Class III INVENTORY

Map 1 of 2

1232 1233 1234 1235 1236 R16W R15W

AZ 130 Cultural Inventory (Pakoon Springs) - BC 2007

AZ-BLM-130-2007-052

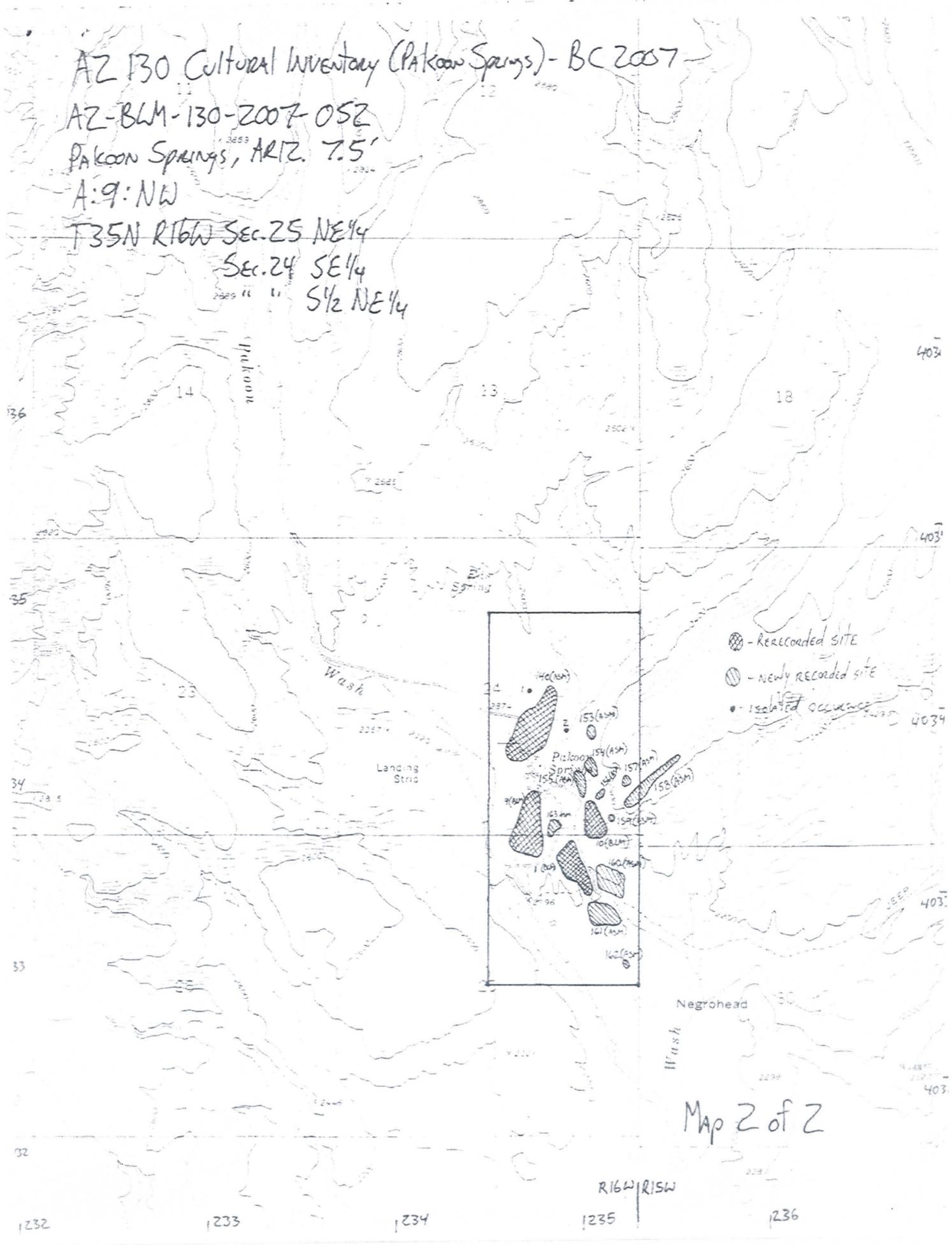
Pakoon Springs, ARIZ. 7.5'

A:9:NW

T35N R16W Sec. 25 NE 1/4

Sec. 24 SE 1/4

Sec. 24 S 1/2 NE 1/4



Map 2 of 2

1232 1233 1234 1235 1236

## **Key Personnel**

**Project Coordinator: Kathleen Harcksen** is a natural resource manager for the Bureau of Land Management. She worked for 25 years as a Forester for the USDA Forest Service and is a Certified Silviculturist in Region 5 (California). For the first 15 years with the USFS, Ms. Harcksen was an interdisciplinary team lead and project manager; and oversaw the planning and implementation of timber sales. For the next 10 years she was the team lead, in the research branch of the Forest Service, and responsible for the planning, development and implementation of large-scale, interdisciplinary, cause and effect research. She facilitated the interdisciplinary team of scientists to develop and design the research projects. She was a liaison between the research and management branches of the Forest Service (National Forest System). She coordinated the development of the timber sale contracts to implement the research treatments, and monitored implementation to ensure research objectives were obtained. Currently Ms. Harcksen is the Assistant Manager of the Grand Canyon – Parashant National Monument, and supervises the Monument employees responsible for managing the natural resources on the monument. Ms. Harcksen earned here B.S. in natural resource management from the University of Nevada, Reno and her M.S. in applied forest ecology from Oregon State University, Corvallis.

**Kelly J. Burke** is the Director of the Grand Canyon Wildlands Council. Starting as a volunteer in March 1996, then as consultant and eventually staff, she cofounded and directed the organization. She coordinates the programs, outreach, and fundraising for the Wildlands Council, as well as participates in the regional ecological assessments and analyses. She received a B.A. with honors in Geology/Art History from the University of California, Santa Barbara and an M.S. in Structural Geology from Northern Arizona University. Ms. Burke has 14 years experience in geological mapping including six years of research trips down the Colorado River in Grand Canyon.

**Dr. Lawrence E. Stevens** is the Senior Ecologist for Grand Canyon Wildlands Council, as well as the Curator of Ecology and Conservation at the Museum of Northern Arizona and the Grand Canyon National Park All Taxa Biological Inventory Coordinator. He received his undergraduate degree from Prescott College and his M.S. and Ph.D. from Northern Arizona University in Flagstaff, Arizona. He is an avid natural historian and river runner, and has spent the past 30 years engaged in ecological research on rivers in the American Southwest. His studies have focused on native and non-native plant-herbivore interactions in riparian habitats, as well as linkage between riparian and aquatic components of aridlands fluvial ecosystems, particularly the Colorado River in the Grand Canyon. Dr. Stevens was the project lead for Grand Canyon Wildlands Council for the Lees Ferry and Hidden Slough restorations in Glen Canyon National Recreation Area, and a tamarisk dendrochronology project and the successful translocation of endangered humpback chub in Grand Canyon National Park. Dr. Stevens will oversee information compilation and planning, and will assist with site restoration planning and implementation.

**Kim Crumbo** is currently the Director of Conservation for the Grand Canyon Wildlands Council. He is an active member of the Grand Canyon Wolf Recovery Project and The Wildlands Network steering committees, and is a Fellow for The Rewilding Institute. From 2000 to 2010 he has conducted restoration of riparian habitats and roads identified for closure on BLM, NPS, and USFS lands. He served 20 years with the National Park Service in Grand Canyon as the river ranger and later as Wilderness Coordinator where he also led revegetation and trail stabilization projects with volunteers. Kim worked as professional river guide for 10 years and two years as the Utah Wilderness Coordinator for the Sierra Club. Before his experience on rivers and in wilderness activism, science-based conservation and restoration, he spent four years with the Navy's SEAL Team One completing two combat deployments to Vietnam. Kim received a B.S. in Environmental Studies from Utah State University, with postgraduate work in outdoor recreation. In 1999, Kim received the National Park Service's "Director's Wilderness Management and Stewardship Award." In 1999 The Wilderness Society presented him with "Environmental Heroes Award." As a result of his military service, Kim earned several combat decorations, including a Bronze Star. His publications include A River Runners Guide to the History of Grand Canyon, an article in the International Journal of Wilderness titled Wilderness Management at Grand Canyon: Waiting For Godot?, and an article about the ecological impacts of roads in Wild Earth magazine.

**R.J. Johnson** is principal-in-charge for Geosciences Consulting, a small independent water resources, geologic, and environmental consulting firm, based in Boulder City, Nevada. He earned his B.S. degree in geology from University of Nevada - Las Vegas and his M.S. degree in geology from Idaho State University. He is a professional geologist in Arizona, California, and Utah; a certified hydrogeologist in California; and a certified environmental manager in Nevada. Through his twenty-five year career Mr. Johnson has wide-ranging project management and hands-on experience in hydrogeology, geology and environmental work throughout the southwest. This experience includes water resource management; ground-water exploration, research, and development; recharge and infiltration studies; ground-water system and basin analysis; ground and surface-water, spring sampling, and inventory studies; hydrologic and geologic mapping; vadose zone monitoring and evaluation; and water quality, geochemical and stable isotope studies. He has completed structural geology, subsidence, and mapping studies; geologic and environmental hazard evaluations; and environmental remedial investigations and feasibility studies. He recently was responsible for water-quality assessment, interpretations, and monitoring during successful restoration efforts at Pakoon Spring within Grand Canyon-Parashant National Monument and made recommendations for restoration design that best maintained the springs health. Restoration was a cooperative effort between Grand Canyon Wildlands Council, Arizona Water Protection Fund, and the Bureau of Land Management.

**Robert Andress** received a B.S. from Augustana College and an M.S. degree in hydrogeology from Iowa State University. Mr. Andress has an extensive background in the planning, design and completion of ecological restoration projects and specializes in habitat restoration projects associated with the recovery of threatened and endangered species. Mr. Andress is adept at determining a project approach and applying construction methods that minimize impact during the restoration process. Mr. Andress has completed several successful fish and amphibian habitat design, construction, and restoration projects for the US Fish and Wildlife Service. Mr. Andress has prepared assessment and feasibility reports while working with federal agencies,

municipalities, and stakeholder groups regarding resource management issues. Recent project topics include spring and river channel habitat quality assessment, hydraulic modeling and spring channel restoration design, declining instream flows, habitat suitability assessment, and habitat restoration recommendations and planning. His primary responsibilities include project development and management, completion and oversight of studies and assessments, and design and implementation of restoration projects.

**Kathleen Anne Harcksen  
Resume**

**Education:**

- 1968 Nevada Union High School, Grass Valley, California
- 1988 Bachelor of Science, Natural Resource Management,  
University of Nevada, Reno
- 1990 Masters in Applied Forest Ecology  
University of Washington, Seattle - & Oregon State University, Corvallis

**Work Experience:**

1988 – 1990 Interdisciplinary Team Lead, Forester, Timber Sale Planner, Silviculturist on the Plumas National Forest, CA

Responsible for facilitating an interdisciplinary team of natural resource specialists to develop the District Timber Sale program and environmental compliance (NEPA). I developed the harvest prescriptions and completed the environmental analyses.

1990 - 2000 Interdisciplinary Research Team Lead, Redding  
Silviculture Lab of the US Forest Service

Facilitated a natural resource interdisciplinary team of scientists to develop, plan and implement two large-scale interdisciplinary "cause and effect" research projects in Northern CA.

Received a \$1,000 cash award from the Chief of the Forest Service.

Became a Certified Silviculturist and a co-author of "*Long-term Research to Accelerate the Development of Late-successional Forest Vegetation at Little Horse Peak*", 1999

2000 – 2002 Environmental Coordinator for Highway construction, BLM, Kingman Field Office  
Liaison between the Arizona Department of Transportation, Keiwit, Inc. (the highway construction contractor), and the BLM. This was a Design/Build project, and I was responsible for ensuring the project met all environmental compliance criteria.

Received the Sec. of Interior's 4-C's Award in recognition of BLM, FHWA, and ADOT Partnership

2002 – 2006 Assistant Parashant Monument Manager, BLM, AZ Strip District Office  
Supervised nine federal employees (both BLM and NPS). I developed the vegetation management decisions in the Grand Canyon – Parashant National Monument Resource Management Plan. I ensured that the Pakoon Springs alligator (Clem) was safely captured and provided a good home.

2006 – 2010 Project Manager, Parashant Monument,  
Developed plans, funding proposals, and environmental compliance documents to rehabilitate hundreds of thousands of acres burned in Pinyon Juniper and Mojave Desert.

Initiated several research projects to learn how to rehabilitate burned Mojave Desert, and how to reduce the amount of exotic weed fuel production.

Worked with the Grand Canyon Wildlands Council to initiate the Pakoon Springs Rehab Project.

Received the fourth national National Landscape Conservation System Leadership Award.

## CURRICULUM VITAE: LAWRENCE EDWARD STEVENS, PhD

- DATE OF BIRTH:** 17 November, 1951, Cleveland, Ohio
- MAILING ADDRESS:** Curator of Ecology and Conservation  
Museum of Northern Arizona  
3101 N. Ft. Valley Rd.  
Flagstaff, AZ 86001  
(928) 774-5211 x 204  
[farvana@aol.com](mailto:farvana@aol.com)
- EDUCATION:** PhD Zoology, Northern Arizona University, Flagstaff, 1989  
MS Biology, Northern Arizona University, Flagstaff, 1985  
Selected coursework in biology and fine arts, University of Arizona, 1977-1978.  
BA Biology and fine arts, with honors, Prescott College, Prescott, Arizona, 1974  
Graduated with honors, Rocky River High School, Rocky River, Ohio, 1970  
Born, Cleveland OH 17 Nov. 1951
- PERTINENT EXPERIENCE, EMPLOYMENT, BOARDS:**
- 2007 – 2008 Grand Staircase National Monument Advisory Committee Chair
  - 2006-present Curator of Ecology and Conservation, Museum of Northern Arizona, Flagstaff
  - 2006-present Grand Canyon National Park ATBI Coordinator
  - 2005-present Science Advisor for Ecological Monitoring & Assessment, Babbitt Foundation and Northern Arizona University
  - 2004-present Conservation Representative for GCWC on the Glen Canyon Dam Adaptive Management Technical Work Group
  - 2003-2005 Grand Staircase National Monument, Assistant Chair and Science Advisor
  - 2004-2006 Board of Directors, Museum of Northern Arizona, Flagstaff
  - 2003-2005 USFWS-trained WIFL surveyor, Yuma, AZ
  - 2001-present Yuma East Wetlands Restoration Project, vegetation and avifaunal analyses and monitoring
  - 2000-present Senior Science Advisor, Grand Canyon Wildlands Council, Inc.,
  - 1999-present Principal Investigator for Stevens Ecological Consulting, LLC, Flagstaff
  - 1999-2006 Associate editor, Western North American Naturalist
  - 1998-1999 Ecologist, Department of the Interior, Grand Canyon Monitoring and Research Center, Flagstaff, AZ.
  - 1995-1997 Ecological Analyst, Applied Technology Associates, Inc.
  - 1993-present. Adjunct Faculty, Prescott College, Prescott, AZ.
  - 1990-present. Adjunct Faculty Member, Department of Biological Sciences, No. AZ Univ.
  - 1988-1994 Ecologist, Grand Canyon National Park Resource Management and Planning Division, Grand Canyon, Arizona.
  - 1986-present Research Associate, Museum of Northern Arizona, Flagstaff, Arizona.
  - 1989-1991 Summer faculty, No. AZ Univ., Department of Biological Sciences
  - 1986-1989 Doctoral research, Northern Arizona University. PhD completed in May, 1989
  - 1983-present Editor, Red Lake Books,, Flagstaff
  - 1983-1989, 1995-2003, 2006-present -- Whitewater guide in Grand Canyon for Wilderness World, Arizona Raft Adventures and Outdoors Unlimited, the National Park Service, and the Bureau of Reclamation, Flagstaff, Arizona.; >400 trips through Grand Canyon, as a guide or trip leader, primarily guiding 18' oar-powered rafts

## RESUME FOR

**Kim Crumbo**

P.O. Box 1033

Grand Canyon, Arizona 86023

928-638-2304

[kcrumbo@grand-canyon.az.us](mailto:kcrumbo@grand-canyon.az.us)

### **Wilderness/Wildlife Advocate; 1999 to Present**

I am currently the Conservation Director for the Grand Canyon Wildlands Council (GCWC), a regional conservation organization dedicated to the protection and restoration of wild nature in the 36-million acre Grand Canyon Ecoregion. My principal current tasks include direct engagement with the conservationist's working groups for Kaibab, Coconino, and Apache-Sitgreaves national forests Forest Plan Revision and their respective Travel Management Plans, including development of comprehensive scoping comments and other documents. This effort includes developing a comprehensive wildlife conservation strategy for the national forest. During this time I have established and maintained close professional relationships with key staff of conservation organizations including The Wilderness Society, Center for Biological Diversity, The Wildlands Network, Western Wildlife Conservancy, White Mountain Conservation League, Defenders of Wildlife, Arizona Wilderness Coalition, Sierra Club and others.

My work includes active participation on the steering committee for two coalitions dedicated to Southwestern wolf recovery. The first, [Mexicanwolves.org](http://Mexicanwolves.org), is a collaborative effort of local, regional, and national conservation, scientific and sportsmen's organizations, and concerned citizens using the Internet to help save the endangered Mexican gray wolf. The second coalition is the Grand Canyon Wolf Recovery Project, a Southwest regional coalition working to return wolves to their historic home throughout the Grand Canyon region.

A key element of my current position is the development and implementation of strategic conservation plans for the Grand Canyon Ecoregion. I co-authored the most recent iteration of GCWC's Wildlands Network Design (WND), *Safe Havens, Safe Passages: Protecting Wild Nature in the Grand Canyon Ecoregion*. I was the principal author for two major WND implementation proposals: *Arizona Strip Resource Conservation Area: A Proposal*; and *Mogollon Wildlife Conservation Area: A Proposal*. Both documents were submitted as part of our engagement in BLM and USFS land use management plans. I am currently finalizing our wildlife conservation area proposal for the North Kaibab Ranger District (electronic copies available on request). My responsibilities include updating and implementing the Grand Canyon Ecoregion WND, generally through the agencies' land use planning processes described above.

I am responsible for establishing and maintaining professional relationships with other conservation groups, legislators and their staff, and agency personnel as well as general public outreach. I also share grant writing responsibilities with the GCWC Executive Director, receiving sustained funding for our wildlands projects from grants ranging between \$5,000 and \$90,000. Throughout my career I have made numerous public speaking engagements and I have written a variety of conservation related reports, letters to the editor and opinion editorials, books and magazine articles.

### **Past Positions and Responsibilities**

For two years (2001-2002) I was employed as the Northern Representative for the Arizona Wilderness Coalition. I also worked briefly for the Southwest Forest Alliance. My tasks included direct involvement with the BLM Arizona Strip RMP revision process, including the Grand Canyon-Parashant and Vermilion Cliffs National Monuments, with special emphasis on preserving and restoring habitat through the development of wilderness and Areas of Critical Environmental Concern proposals. During this time I conducted extensive wilderness inventories, including volunteer programs, on the Arizona Strip resulting in formal wilderness proposals exceeding one million acres. This effort involved extensive fieldwork and extensive research into the history of wilderness review on the Arizona Strip, an evolving BLM wilderness policy, and an overview of ecological conditions. I was actively involved with the Monument Defense working group, which included representatives from the Sierra Club, Grand Canyon Trust, and The Wilderness Society.

### **National Park Service Wilderness Manager- 1979-1999**

I served as the river ranger, resource management specialist and Wilderness Coordinator for Grand Canyon National Park from 1980 to 1999. As Wilderness Coordinator, I provided guidance for NPS wilderness preservation and management for park operations and in park documents. I was the principal author for the Park's 1993 Wilderness Recommendation Update and contributed to the wilderness sections of the Park's 1995 General Management Plan. I also provided substantive, detailed contributions to the 1998 Draft Wilderness Management Plan (electronic copies available on request).

I also worked to rehabilitate or mitigate ground surface disturbance within the Grand Canyon National Park proposed wilderness, particularly the river corridor. For fifteen years, I coordinated the Park's wilderness volunteer program including logistics for complex, three-week river-based wilderness projects. I also contributed to NEPA compliance reviews, and assisted in exotic species inventory and removal. During this time I obtained an extensive knowledge of wilderness policy and law, as well as a working knowledge of NEPA, the Endangered Species, and laws governing the protection of wildlife and cultural resources.

### **Wilderness Advocate**

From 1976 through 1977, I worked as the Sierra Club's Utah Wilderness Coordinator. In that capacity I advocated the Club's Utah wilderness preservation program. I researched and inventoried potential wilderness within applicable federal lands, researched and interpreted wilderness legislative and policy, and wrote articles, opinion editorials, and press releases supporting wilderness and other conservation efforts.

### **River Guide/Trip Leader-1971-79**

During the 1970's I worked as a professional river guide for Ken Sleight Expeditions and Holiday River Expeditions, conducting over 150 river trips as boatman and trip leader on the Colorado, Green Rivers and other rivers. I supervised up to 30 passengers and five staff on 2-14 day river trips in remote areas.

### **U.S. Navy SEAL-1967-71**

Before my work on rivers and wilderness, I served four years with the Navy's SEAL Team One, completing two combat deployments to Vietnam as an automatic weaponsman and later as the Team's combat photographer.

### **Education**

In 1976, I received a B.S. in Environmental Studies from Utah State University, and later obtained postgraduate work in outdoor recreation. I have completed 18 semester hours in Wilderness Management from the University of Idaho's Distance Education Program.

### **Publications**

My published articles include *A River Runners Guide to the History of Grand Canyon*; a chapter in *Grand Canyon: Intimate Views*; a peer-reviewed article in the *International Journal of Wilderness* titled "Wilderness Management at Grand Canyon: Waiting For Godot?" and an article about the ecological impacts of roads in *Wild Earth* magazine.

### **Awards**

My professional awards include a Bronze Star with "V" for Valor in 1970; the National Park Service's 1998 Director's Wilderness Management and Stewardship Award; an award from the Grand Canyon Trust in 1999 for my "Commitment and Dedication to Protecting Wilderness and the Lands of the Colorado Plateau," and The Wilderness Society's "Environmental Heroes Award" in 1999.

### **Board of Directors**

- Western River Guides Association, 1977-79
- Grand Canyon River Guides Association, 1984-86
- Grand Canyon Wildlands Council, 1996 to 2006
- Grand Canyon Private Boaters Association, 2000-2001

- Grand Canyon Music Festival, 2004 to 2006
- Arizona Wildlife Federation, 2005 to 2009
- Arizona Wilderness Coalition, 2007 to present
- Grand Canyon Wolf Recovery Project (Steering Committee), 2006 to present
- The Rewilding Institute (Fellow), 2006 to present
- Wildlands Network (Steering Committee) 2007 to present.
- Mexicanwolves.org (Steering Committee), 2008 to present
- Executive Committee, Plateau Group, Grand Canyon Chapter of the Sierra Club, 2007 to present

### **Memberships**

- The Wilderness Society (Lifetime Honorary Member)
- Sierra Club
- Center for Biodiversity
- Defenders of Wildlife

### **Hobbies, etc**

I actively engage in backpacking, river running, jogging and weight lifting, and general nature observation. I enjoy reading, particularly current events, natural and cultural history, philosophy, good novels, and wilderness-related subjects. I also enjoy music including classical, jazz and some rock'n roll.

I'm 61 years old. My wife, Becky, is the principal for Grand Canyon Unified School and coordinator for Grand Canyon School's International Baccalaureate program. My oldest son, Daniel (32), is pursuing a doctorate in Comparative Literature at the University of Arizona. My youngest son, Zachary (30), obtained a Masters of Fine Arts at the University of Washington and now works as a graphic designer at TriSports, a sporting goods outfit specializing in triathlon athletics.

**References available on Request**

## **R. J. JOHNSON**

Professional Geologist – California #5070  
Professional Geologist – Arizona #26151  
Professional Geologist – Utah #2250  
Certified Hydrogeologist – California #304  
Certified Environmental Manager – Nevada #1218

## **EDUCATION**

Idaho State University: M.S., Geology, 1986  
University of Nevada: B.S., Geology, 1984  
Glendale Community College, California: A.A., 1976

## **PROFESSIONAL HISTORY**

Geosciences Consulting, Principal, 1992 - to present  
Broadbent and Associates, Inc., Senior Geologist, 1990 - 1992  
Mifflin and Associates, Inc., Staff Geologist, 1987 – 1990  
Idaho State University, Teaching Assistant, 1984 – 1986  
Environmental Protection Agency, Quality Assurance Div., Physical Science Aide, 1980 – 1984  
Fastwater Expeditions, Inc., Manager/Guide, 1978 - 1986

## **REPRESENTATIVE EXPERIENCE**

Mr. Johnson's representative experience includes coordinating and executing ground and surface-water research; mine, industry, and municipality assessment and reclamation programs; and hydrogeologic, environmental, and geologic investigations. Mr. Johnson routinely manages, supervises, and implements ground-water exploration, development, water rights, fate and transport, and water supply studies; environmental site assessments and remediation; and geologic and hydrogeologic research. Mr. Johnson writes, reviews, and edits geologic, hydrogeologic, and environmental reports, assessments, proposals, and technical documents. In addition to consulting, Mr. Johnson also teaches geology, hydrogeology, natural history, and outdoor skills for various institutions including: University of Nevada, Las Vegas, Community College of Southern Nevada, and numerous outdoor adventure companies.

Mr. Johnson's specific project experience includes the following:

- Lead hydrogeologist and team member during evaluation, design and restoration efforts at Pakoon Springs, in Parashant National Monument, Arizona. Mapped hydrologic features, designed and implemented discharge and water-quality monitoring, sampled springs for general minerals and environmental isotopes, assembled data and completed reports. The project was in cooperation with Grand Canyon Wildlands Council and Bureau of Land Management and funded through the Arizona Water Protection Fund.
- Investigation team member and lead investigator for geology and hydrogeology during the evaluation of 100 seeps, springs and natural ponds on the Arizona Strip. The investigation included review of existing data, site visits, mapping, discharge measurements, water-quality assessments and interpretations. Recommendations for maintaining water resources health made to Arizona Water Protection Fund. The project was in cooperation with Grand Canyon Wildlands Council.
- Co-project manager and lead field hydrogeologist during the evaluation of Black Mountains area springs in Death Valley National Monument. Mapped hydrologic features, implemented discharge and water-quality monitoring, assembled data and completed report. Established hydrogeologic baseline inventory data to assist with future monitoring and determine the potential to enhance spring discharge. The project was for Death Valley National Monument.

## R. J. JOHNSON

- Lead field hydrogeologist for monitoring and assisted with reporting during the evaluation of springs in the Warm Springs area associated with Moapa Valley Wildlife Refuge, Nevada. Collected spring discharge and water-quality data used as a baseline to track potential affects from surrounding groundwater withdrawal. Constructed hydrogeologic maps for all springs in the region and compiled results into a series of hydrogeologic reports. The project was for Nevada Power Company.
- Investigation team leader and Professional Geologist responsible for Arizona APP point of compliance monitoring well and evaluation determine ground-water flow and water quality characteristics at Phoenix Cement Company's Clarksdale facility in Arizona. Conducted field evaluation, well design, drilling oversight, and reporting.
- Owner's representative and team member for the development of the Southern Nevada Supplemental Airport. Evaluated flood control and conceptual drainage plans, assisted with the location of geotechnical test sites, estimated water use requirements, and participated in water use project planning. Results from the evaluation will be incorporated into an EIS.
- Co-lead water resources evaluation and water supply development for a 5,000 home development project in Pahrump, Nevada. Efforts were wide ranging and included developing a new quasi-municipal potable water distribution system, evaluating basin wide aquifer characteristics, determining ground-water exploration sites, writing detailed RFP drilling and testing specifications, and assisting with water rights permitting efforts.
- Investigation team member in support of developing the Department of Energy/Nye County Cooperative Yucca Mountain Drilling Program (DOENCC). Responsibilities included the review of DOE hole history reports and developing a dry drilling program that included dual wall reverse circulation drilling, cross-borehole gas tracer tests, and long term vadose zone and saturated zone monitoring.
- Project manager, strategist, and investigator for a water resources evaluation and water balance study to conserve and refine water uses for Pabco Gypsum's mine and process water system in Nevada. Evaluated water inflow, outflow, consumptive use, evaporation, etc. to improve a limited water resource portfolio.
- Investigation team leader to evaluate the potential affects from ground-water withdrawal in Ivanpah Valley, California for the Primm Valley Golf Club. The investigation included reviewing and interpreting existing and new data in support of a Conditional Use Permit. Developed and implemented a monitoring plan, conservation measures, aquifer testing, and completed reports to satisfy requirements.
- Owner's representative and team member for the development of the Ivanpah Energy Center, in southern Nevada. Evaluated site conditions, infrastructure availability, and physical parameters for the project. Acquired water supply through secondary wastewater recycling, located pipelines and transmission line rights-of-way, and contributed to Plan of Development, owner's Environmental Assessment, and wastewater plant Facility Plan. Fully participated in BLM developed Environmental Impact Statement (EIS) by assisting EIS contractor with data needs, coordination, review, evaluation, and interpretation.
- Project manager and lead investigator for completing an Environmental Protection Agency (EPA) sole source aquifer designation petition for the N, M, D, and unconsolidated aquifers in southeastern Utah for the White Mesa Ute Mountain Ute Tribe, Utah.
- Evaluated the ground-water system associated with the Hickory aquifer for Oglebay Norton Industrial Sands, Texas. Completed well inventory, water source evaluation and assisted with ground-water modeling. Established ground1water monitoring program and reporting plans.

# ROBERT J. ANDRESS

PO Box 711134 • Salt Lake City, Utah 84171 • phone 801.390.7174 • rjandress@gmail.com

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## SPECIALTY

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Gradient, LLC specializes in the restoration of aquatic ecosystems including springs, streams, and wetlands primarily for sensitive species recovery efforts. Our experience is focused in restoration planning and design, field surveys and assessments, hydrogeology, geomorphology, hydrologic and hydraulic modeling, construction, revegetation, irrigation system design and installation, surface and groundwater quality, habitat monitoring, and water resource issues.

## EMPLOYMENT

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GRADIENT, LLC <i>Owner, Project Manager and Hydrogeologist</i> Gradient, LLC specializes in ecological planning, design, and restoration.	2010 - present <i>Salt Lake City, Utah</i>
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OTIS BAY, INC. <i>Project Manager and Hydrogeologist</i> Project manager for a wide variety of aquatic habitat restoration and resource management related activities including site assessment and surveys, hydraulic modeling, restoration design and construction, and surface water, groundwater, recreation, and water resource issues.	2003 - 2010 <i>Reno, Nevada</i>
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MONTGOMERY WATSON HARZA <i>Project Hydrogeologist</i> Hydrogeologist on numerous soil and groundwater investigation and characterization studies. Performed groundwater pump and tracer tests as well as monitoring well and lysimeter installation. Completed soil and groundwater investigation and monitoring field programs.	1999 - 2003 <i>Salt Lake City, Utah</i>
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## EDUCATION

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HYDROGEOLOGY, M.S. <i>Iowa State University</i>	1999 <i>Ames, Iowa</i>
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GEOLOGY, B.S. <i>Augustana College</i>	1995 <i>Rock Island, Illinois</i>
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## MAJOR PROJECTS

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ASH MEADOWS NATIONAL WILDLIFE REFUGE, NEVADA – (USFWS)  
*Project Manager/Hydrogeologist/Geomorphologist*

- Geomorphic and biologic assessment of the refuge with an

- Project included the assessment of restoration potential for riparian habitat adjacent to the East Fork of the Walker River and the design and construction of restored riparian habitat within USFWS property. Design and installation of wetland and upland revegetation and irrigation.

**CARSON RIVER, NEVADA (BLM)**

*Hydrogeologist/Geomorphologist*

- Assessment of the Middle Carson River for the purpose of recovering and sustaining the riverine ecosystem.

**MUDDY RIVER, NEVADA (Clark County)**

*Project Manager/Hydrogeologist/Geomorphologist*

- Assessment of the geomorphic processes, riparian forest, and hydrology of the Muddy River and development of restoration and ecological enhancement alternatives.

**MOAPA NATIONAL WILDLIFE REFUGE, NEVADA (USFWS)**

*Hydrogeologist/Geomorphologist*

- Project involves the ongoing restoration of spring pool and channel riparian habitat. Past restoration activities have included the removal of recreational swimming facilities and non-native vegetation prior to restoration of spring pool and spring channel habitat. The projects provide habitat for native and endemic fishes and invertebrates that inhabit the system. Studies and projects included the study of the effects on channel habitat due to declining spring flows and the construction of a large spring channel habitat viewing chamber.

**TRUCKEE RIVER, NEVADA – VISTA, NEVADA TO PYRAMID LAKE (Army Corps of Engineers)**

*Hydrogeologist/Geomorphologist*

- Truckee River restoration and geomorphic assessment from Vista, Nevada to Pyramid Lake, Nevada to identify sites suitable for future restoration activity.

**DESERT NATIONAL WILDLIFE REFUGE, CORN CREEK, NEVADA (USFWS)**

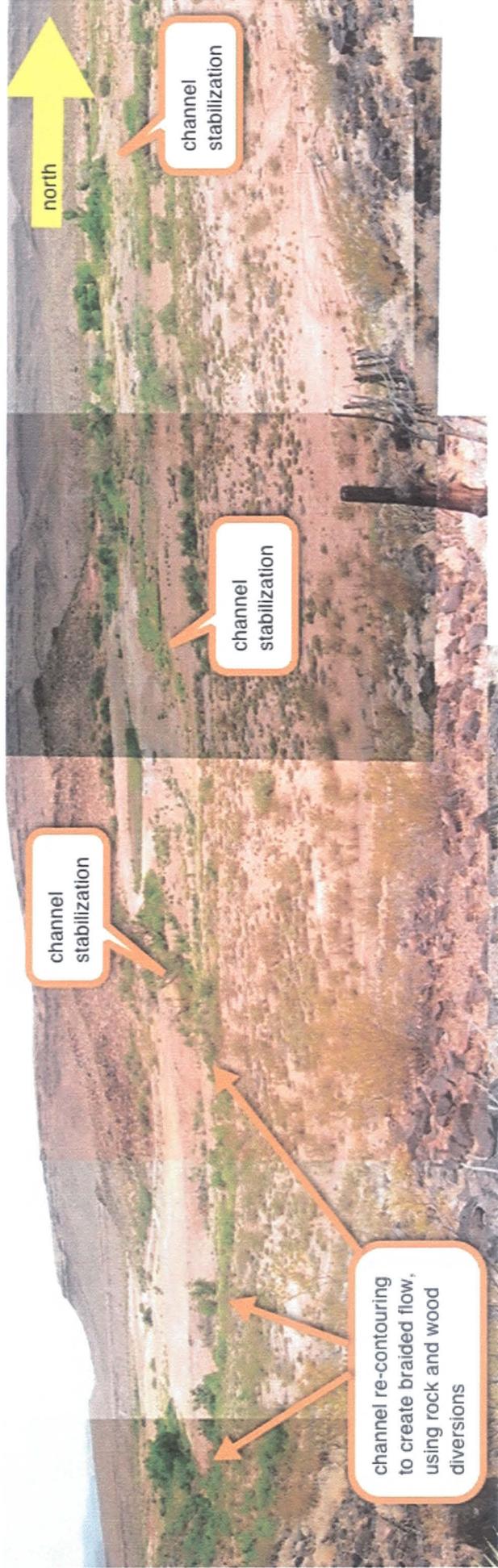
*Hydrogeologist/Construction Implementation*

- The project involved restoration of the spring pools, outflow channels and native vegetation that were once buried, ditched and removed. Also, design and construction of a refugium for the native Pahrump poolfish.

**PARKER RANCH, NEVADA (The Nature Conservancy)**

*Hydrogeologist/Construction Implementation*

- The project involved the modification of a former spring-fed irrigation reservoir to spring pools and outflow channels for the purpose of creating habitat suitable for the Amargosa toad and Oasis Valley Speckled dace.



channel stabilization

channel stabilization

channel stabilization

channel re-contouring to create braided flow, using rock and wood diversions

north





Pakoon Wash outlined in dk. gray lines: reconfigure to braided stream, install check dams, plant native species on terrace rise, and recontour/reseed upland flood terrace. View to SW.

## **Description of Monitoring/ Sampling Plans**

*NOTE: All plans are subject to discussion with agencies and partners.*

The grantee will create a plan for monitoring flow and water chemistry, revegetation growth and survival, semi-annual monitoring of aquatic and wetland wildlife (particularly avifauna, insects, and small mammals).

**A.1. Revegetation Monitoring** will involve site photography from fixed photo points on at least a semi-annual basis. The contractor will monitor the growth (stem length increase) and survival of a cohort of 50 established plants of each replanted species, where possible. This monitoring also will document the health of each plant. The contractor will monitor stand development by recording the visually-estimated percent cover in five strata of each native and non-native plant species in each arena. These strata include: aquatic, ground cover (deciduous, annual or biennial), shrub cover (0-4 m woody perennial vegetation), middle canopy (4-10 m woody perennial), and tall canopy (>10 m woody perennial), as well as the visually estimated percent cover of litter, wood, precipitate, and wetted area on each polygon. Any human or livestock impacts or threats to the site also will be documented.

**A.2. The Flow and Water Chemistry Monitoring Plan** is likely to include semi-annual measurement of flow at major discharge points of each arena, and standard measurement of the concentration of field metrics (temperature, pH, and specific conductance) and a filtered 0.1 L sample of water will be collected for laboratory analysis of base cations, nitrate-nitrite and orthophosphate nutrients, and sulfate in a triple acid-washed sample bottle. The plan will include recommended timing of monitoring, metrics of success, and plans for long-term information management.

**A.3. The Revegetation Monitoring Plan** will likely include monitoring the growth (stem length increase) and survival of a cohort of 50 established plants of each replanted species, where possible. The revegetation plan also will document the health of each plant, as well as the visually-estimated percent aquatic, ground-, shrub-, and tree-cover of each plant species in each arena, as well as any human or livestock impacts or threats to the site. The plan will include recommended timing of monitoring, metrics of success, and plans for long-term information management.

**A.4. Wildlife Monitoring Plan.** The grantee will design a wildlife monitoring plan to document: a) avian use of the site, likely through timed observation of each area; b) invertebrate colonization and use of the site, likely by observation, spot sampling, sweep netting, the use of black and white lights and Malaise trapping, and quantitative sampling, where possible; and c) a small mammal inventory, to establish a baseline of present species, with recommendations about further monitoring. The wildlife plan will include

recommended timing of monitoring activities, metrics of success, and plans for long-term information management.

### **Description of Revegetation/ Restoration Plans or Research Designs**

**A. Implementation Plan to Expand and Enhance Riparian Habitat:** Design channel and stream-bed stabilization, including gabion features, nick-point aggradation, and deflection of incised flow using rock pilings. The contractor will base decisions about channel design based on evaluation of the upstream dry-braided channel section, as well as nearby desert streams, such as those at Burro Spring, in Burro Creek, or elsewhere in the AZ-NV-UT Corners region. This plan will be developed using the 0.5 m contour site base map, and will include recontouring design of the old agriculture fields to recreate flood plains, and including soil cut and fill, removal and/or transfer. A revegetation design also will be prepared, and will include characteristic native species of the site, as well as which species shall be planted in what zones and at what densities. The plan will include definition of metrics of success.

**B. Plan to Remove Non-Native Invasive Aquatic Species:** Create removal plan for bullfrogs (mature, immature, and tadpole), as well as mosquito-fish. This plan will consider mechanical (trapping, capture, shooting) as well as chemical control methods, the timing and duration of those removal efforts. The plan will include definition of metrics of success.

**C. Plan to Identify and Translocate Local Rare Species:** Create plan to identify which locally rare species of plants, aquatic and wetland invertebrates, fish, amphibians, and other vertebrates can and should be reintroduced or introduced. The plan should include consideration overall translocation goals and objectives; compliance, permitting, and appropriate partnerships; the species' habitat and food requirements; water or soil geochemical requirements; stock availability; parasite control treatment (if necessary); translocation timing and replication; and metrics of success [monitoring is considered in (4) below].

**D. Plan for Visitor Education, Outreach, and Footpath Construction:** The contractor will create a plan for visitor outreach and educational materials. The design of this plan will include construction of a footpath minimize visitor impact on springs; b) development of a brochure and other outreach materials, such as a virtual tour and project history; and c) presentation of project results on the internet. The outreach plan will include recommended timing of activities and metrics of success.

### **Existing Plans, Reports, Information Relevant to the Project**

Previous studies and analyses of Pakoon Springs that are relevant to this project include: Grand Canyon Wildlands Council (2002), which documented water chemistry and vegetation at the site. GCWC (2010) is presently completing the final report on recent efforts to restore Pakoon Springs. Other useful documents include the Presidential Proclamation and enabling legislation of Grand Canyon-Parashant National Monument. The BLM Arizona Strip RMP outlines the array of management and restoration planned on the Monument. An array of BLM technical reports exist on site compliance, archeology, regional vegetation, springs assessment of Pakoon Springs, and other topics. USFWS and partners signed the Conservation Agreement and Rangewide Conservation Assessment and Strategy for the Relict Leopard Frog (formerly *Rana onca*).



THE STATE OF ARIZONA  
**GAME AND FISH DEPARTMENT**

5000 W. CAREFREE HIGHWAY  
PHOENIX, AZ 85086-5000  
(602) 942-3000 • WWW.AZGFD.GOV

**GOVERNOR**

JANICE K. BREWER

**COMMISSIONERS**

CHAIR, JENNIFER L. MARTIN, PHOENIX  
ROBERT R. WOODHOUSE, ROLL  
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GARY R. HOVATTER  
BOB BROSCHEID



August 24, 2010

Arizona Water Protection Fund Commission  
c/o Department of Water Resources  
3550 N. Central Avenue  
Phoenix, AZ 85012

Dear Commissioners:

This letter is to express my enthusiastic support of the grant proposal entitled ***Pakoon Wash and Pakoon Springs Restoration and Enhancement Project*** from the Bureau of Land Management, Grand Canyon – Parashant National Monument. Pakoon Springs is one of the two largest springs on the Arizona Strip. Funding this proposal will support the restoration of this critical ecosystem by removing nonnative bullfrogs and enhancing the stream channel, and associated riparian habitat. Renovation of Pakoon Springs is one of the best opportunities to conserve rare native species such as the relict leopard frog.

From the 1970's to the present, the relict leopard frog, like many amphibians worldwide, declined dramatically. Recognizing the precarious status of this species, Arizona Game and Fish Department and partners developed, signed (in 2005) and made significant commitments to manage this species under "Conservation Agreement and Rangewide Conservation Assessment and Strategy for the Relict Leopard Frog (*Rana onca*).” This voluntary agreement mapped the “conservation road forward” and obviated the need to list this species under the Endangered Species Act. Additional Department commitments are outlined in our State Wildlife Action Plan and our strategic, operational and implementation plans. We also will pursue a cooperative agreement with Bureau of Land Management to support this project to the maximum extent practicable.

The staff at the Arizona Game and Fish Department is committed to helping with the project and looks forward to working with the Arizona Water Protection Fund, the Bureau of Land Management and the Grand Canyon Wildlands Council to successfully complete this important project.

Sincerely,

Michael J. Sredl  
Ranid Frogs Projects Coordinator

MJS: ms



## United States Department of the Interior

U.S. Fish and Wildlife Service  
Arizona Ecological Services Office  
2321 West Royal Palm Road, Suite 103  
Phoenix, Arizona 85021-4951  
Telephone: (602) 242-0210 Fax: (602) 242-2513



In reply refer to:

AESO/SE  
22410-2010-CPA-0090

August 30, 2010

Arizona Water Protection Fund Commission  
c/o Department of Water Resources  
3550 North Central Avenue  
Phoenix, Arizona 85012

Dear Commissioners:

This letter is in support of the grant proposal entitled *Pakoon Wash and Pakoon Springs Restoration and Enhancement Project* from the Bureau of Land Management, Grand Canyon – Parashant National Monument. Pakoon Springs is one of the two largest springs on the Arizona Strip. Funding this proposal will support the restoration of this critical ecosystem by removing nonnative bullfrogs and enhancing the stream channel and associated riparian habitat. Renovation of Pakoon Springs is one of our best opportunities to conserve the relict leopard frog, a rare native species.

From the 1970's to the present, the relict leopard frog, like many amphibians worldwide, declined dramatically. Recognizing the precarious status of this species, the U.S. Fish and Wildlife Service and partners developed, signed (in 2005), and made significant commitments to manage this species under the "Conservation Agreement and Rangewide Conservation Assessment and Strategy for the Relict Leopard Frog (*Rana onca*)." This voluntary agreement mapped the "conservation road forward" and has, thus far, precluded the need to list this species under the Endangered Species Act.

The staff at the U.S. Fish and Wildlife Service is committed to continue helping with the project and looks forward to working with the Arizona Water Protection Fund, the Bureau of Land Management (BLM), the Arizona Game and Fish Department (AGFD), and the Grand Canyon Wildlands Council to complete this important project. We have worked collaboratively with the BLM, AGFD, and the Grand Canyon Wildlands Council for the past three years, providing staff time, travel, and vehicle and equipment use toward the success of this project. We anticipate the same levels of commitment for the next phase, totaling approximately \$6,270: 14 Biologist-Days and associated per diem, and three trips to Pakoon Springs.

Salary costs: \$4985.82  
Travel: \$300.00  
Vehicle costs: \$984

Should you require further assistance or if you have any questions, please contact Brian J. Wooldridge at (928) 226-0614 (x105) or Brenda Smith (x101) of our Flagstaff Suboffice.

Sincerely,

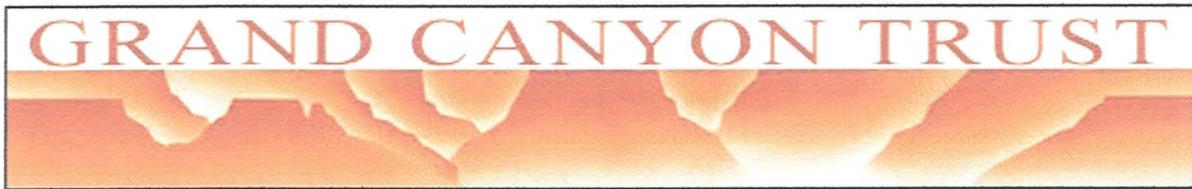


Steven L. Spangle  
Field Supervisor

cc: (electronic):

Monument Manager, Grand-Canyon Parashant National Monument,  
Bureau of Land Management, St. George, UT  
Regional Supervisor, Region 2, Arizona Game and Fish Department, Flagstaff, AZ  
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

W:\Brian Wooldridge\Pakoon Restoration Support Letter 2010\_Final.docx:jkey



August 30, 2010

Arizona Water Protection Fund  
Arizona Department of Water Resources  
3550 North Central Ave.  
Phoenix, AZ 85012

Dear Arizona Water Protection Fund Commissioners,

Grand Canyon Trust would like to offer its support for Grand Canyon Wildlands Council's (GCWC) proposal to restore native vegetation to and develop a monitoring program for Hidden Slough and Leopard Frog Marsh in Glen Canyon National Recreation Area. Our organization is dedicated to protecting and restoring the landscapes, flowing rivers, clean air, diversity of plants and animals, and areas of beauty and solitude of the Colorado Plateau, and this proposed work fits well within our mission. Beyond this, we have witnessed the great success associated with GCWC's revegetation project at Lee's Ferry, and are confident that this project will also have positive outcomes that benefit native plant and wildlife species. Finally, we believe this type of work will help to bolster the success of other riparian restoration and invasive species control projects that have been funded by AWPF in the greater Grand Canyon region, by helping to systematically eliminate source populations of tamarisk below Glen Canyon Dam.

We look forward to the opportunity to provide support and assistance to Grand Canyon Wildlands Council to restore these important riparian areas.

Sincerely,

Christine Albano  
Restoration Program Coordinator  
Grand Canyon Trust



**Western  
Watersheds  
Project**

**Arizona Office**

PO Box 2264

Tucson, AZ 85702

Email: [Arizona@westernwatersheds.org](mailto:Arizona@westernwatersheds.org)

web site: [www.westernwatersheds.org](http://www.westernwatersheds.org)

*Working to protect and restore Western Watersheds*

30 August 2010

Arizona Water Protection Fund  
Arizona Department of Water Resources  
3550 North Central Ave.  
Phoenix, AZ 85012

RE: Arizona Strip BLM's proposal to restore and enhance Pakoon Wash and Pakoon Springs on the Grand Canyon-Parashant National Monument

Dear Commissioners,

We are writing today to express our support for the Bureau of Land Management proposal for funding with which to restore and enhance Pakoon Wash and Pakoon Springs on the Grand Canyon-Parashant National Monument. Our organization, Western Watersheds Project, works extensively with on land management issues in the project area, and in particular, in frequent collaboration with the Pakoon Springs primary cooperator Grand Canyon Wildlands Council (GCWC). We are well aware of how dedicated GCWC is to the cause of benefiting the region's wildlife, educational opportunities, and natural heritage and of the important restoration work that BLM staff and GCWC have undertaken at Pakoon Springs.

In particular, we believe that the work being proposed by the BLM is critically important to ensure that these wetlands are restored in context of scientific principles. Given the substantial background experience and expertise GCWC has with and about the Arizona Strip's wetlands, the collaborative effort between GCWC and the Bureau of Land Management ensures a careful and skilled approach to these projects.

We sincerely hope that the Arizona Water Protection Fund recognizes that this proposal builds on a project that has already been a success, and that by providing funding to the BLM to carry out the next phase of this effort, the Fund will be supporting a robust restoration/enhancement of riparian habitat for native wildlife which will include monitoring and a report to document the project's progress. Given the need for similar efforts around the state and in other National Landscape Conservation System units we sincerely hope the AZ Strip BLM project can become a model for restoration success.

Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Greta Anderson".

Greta Anderson, Arizona Director  
Western Watersheds Project



Conservation  
Lands  
Foundation

August 30, 2010

Arizona Water Protection Fund  
Arizona Department of Water Resources  
3550 North Central Ave.  
Phoenix, AZ 85012

Dear Commissioners:

We are writing to offer full support of the proposal submitted by the Bureau of Land Management, Grand Canyon-Parashant National Monument for the restoration and enhancement of Pakoon Wash and Pakoon Springs.

Pakoon Springs is the largest spring in the Grand Canyon-Parashant National Monument and one of the largest in the entire Arizona Strip. This project will restore a rare and important ecosystem by removing nonnative species, while enhancement of the riparian habitat is a critical step for the restoration of rare native species including the relict leopard frog. This is exactly the kind of restoration project the Conservation Lands was created to encourage.

The Conservation Lands Foundation (CLF) is the only non-profit organization dedicated to exclusively to the protection of the National Landscape Conservation System. Our mission is to protect, restore and expand the Conservation Lands through education, advocacy and partnership. Toward that end we provide grants, training and networking opportunities for locally-based grassroots organizations working to protect individual areas within the Conservation Lands; work with Congress and the BLM to help shape the future of the Conservation Lands; and promote greater public awareness of and appreciation for the irreplaceable human and natural history the Lands contain.

In addition to restoring an ecologically important area within the Conservation Lands, this project is a great example of an effective partnership that leverages public and private resources to protect our natural and cultural resources for the benefit of current and future generations.

Sincerely,

Betsy Buffington  
Vice President for Programs  
Conservation Lands Foundation  
PO Box 1414  
Bozeman, MT 59715  
betsy@conservationlands.org

# Kaibab Band of Paiute Indians



August 27, 2010

Arizona Water Protection Fund  
Arizona Department of Water Resources  
3550 N. Central Avenue  
Phoenix, AZ 85012

Dear Commissioners;

We are writing this letter in support of the proposal to the Arizona Water Protection Fund by the Grand Canyon Wildlands Council (GCWC) and the Bureau of Land Management for the Pakoon Springs and Wash Restoration Project.

This critical wetland system in such an arid expanse within our aboriginal homelands, is important to our Tribe and we maintain strong cultural ties to it, as evidenced by the Paiute name: Pah-koon (translation: warm or hot, water). Rock writing in the area further substantiates our long association with this particular site.

In recognition of that connection, we joined in an earlier effort between the GCWC and the BLM to begin to restore this area to its glory. We have worked closely in the field with both organizations and remain impressed with the expertise of their personnel: the collaboration and commitment shown has been extraordinary to date and we look forward to joining them on more volunteer projects to rehabilitate the Pakoon springs and wash in the years to come.

We strongly advocate the project being proposed and ask that the funding for that to occur be provided to such worthy and committed champions for a cause that is dear to our hearts.

Regards,

LeAnn Skrzynski  
Environmental Program Director  
Kaibab Band of Paiute Indians

Tribal Affairs

HC 65 Box 2  
Pipe Spring, Arizona 86022

Phone (928) 643-7245  
Fax (928) 643-7260



August 28, 2010

Arizona Water Protection Fund  
Arizona Department of Water Resources  
3550 North Central Ave.  
Phoenix, AZ 85012

Dear Commissioners,

The Arizona Native Plant Society (AZNPS) is a statewide nonprofit organization whose mission is to promote knowledge, appreciation, conservation, and restoration of Arizona native plants and their habitats. AZNPS keeps abreast of conservation issues concerning native species and works with the Southwest Rare Plant Task Force to develop strategies for protecting rare species and their habitats.

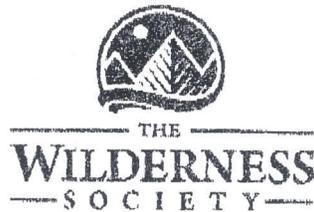
For these reasons, we are writing to endorse two proposals submitted to the Arizona Water Protection Fund.

We support the proposal of the Grand Canyon Wildlands Council (GCWC) to undertake riparian restoration and monitoring at two sites in Glen Canyon National Recreation Area: Hidden Slough and Leopard Frog Marsh. Completion and monitoring of the work GCWC has begun at Hidden Slough is essential to maintain and advance the restoration of native vegetation there and to support the scientific analysis that will inform future efforts of this kind. GCWC's expertise, as well as the experience and success they have gained at Hidden Slough, gives us full confidence in their proposal to restore and monitor plant and wildlife habitat at Leopard Frog Marsh in cooperation with the National Park Service.

We also support the Bureau of Land Management proposal to complete the restoration of Pakoon Springs and restore the riparian habitat of Pakoon Wash. This spring complex is the largest on the Arizona Strip and its associated riparian habitat has been identified by the Grand Canyon Wildlands Council as one of the most promising for restoration. This project promises to be a major step toward securing the future of rare riparian plants and wildlife in Arizona.

Sincerely,

Susan Lamb Bean  
Conservation Chair, Flagstaff Chapter  
Arizona Native Plant Society



Aug. 30, 2010

Arizona Water Protection Fund  
AZ Department of Water Resources  
3550 North Central Ave.  
Phoenix, AZ, 85012

Dear Commissioners,

On behalf of The Wilderness Society (TWS), a 501c3, with headquarters in Washington DC and offices throughout the West, including Arizona, I write in support of the Arizona Strip Bureau of Land Management's proposal to continue restoration work at Pakoon Springs. Located within the Grand Canyon-Parashant National Monument, this spring complex is an important component of this national treasure. Grand Canyon-Parashant National Monument is also a flagship unit of the National Landscape Conservation System and as such, restoration of this unique spring complex is nationally significant. The work that BLM is doing in conjunction with Grand Canyon Wildlands Council and other partners has to date been absolutely critical in the major transformation that has so far occurred at the spring.

The thousands of TWS members in Arizona care deeply about the public lands and waters of the state and the continued restoration and monitoring of this important resource in the monument is something that they and all Arizonans can be proud. The Wilderness Society supports this project and looks forward to a restored Pakoon Springs.

Sincerely,



Kevin Mack  
National Landscape Conservation System  
Campaign Director